1 DECEMBER 1960

ONE SHILLING
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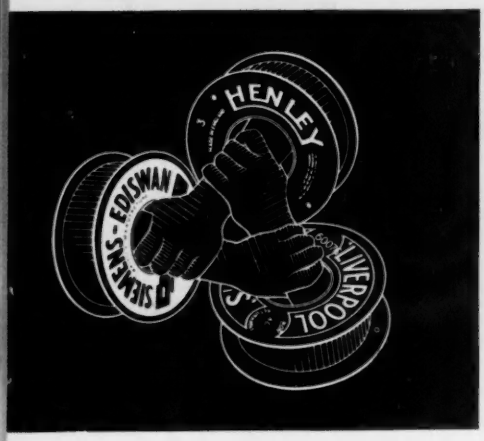
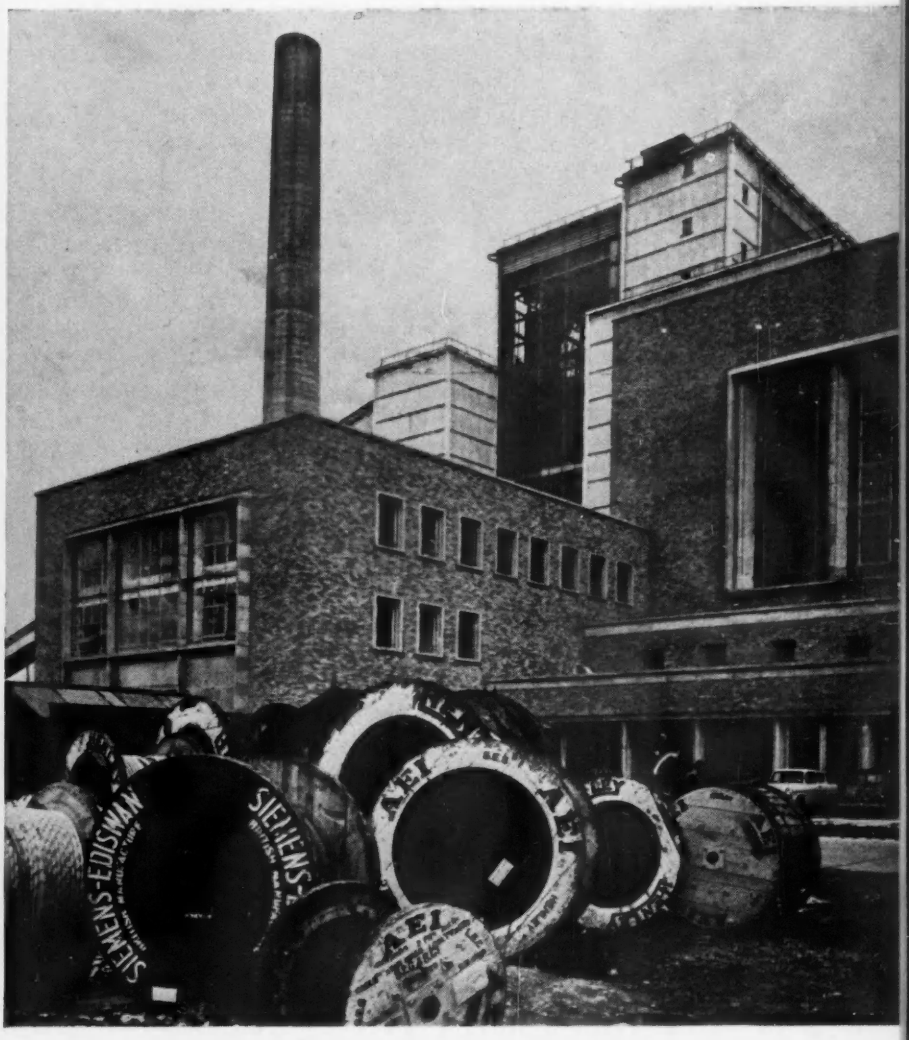
ELECTRICAL TIMES





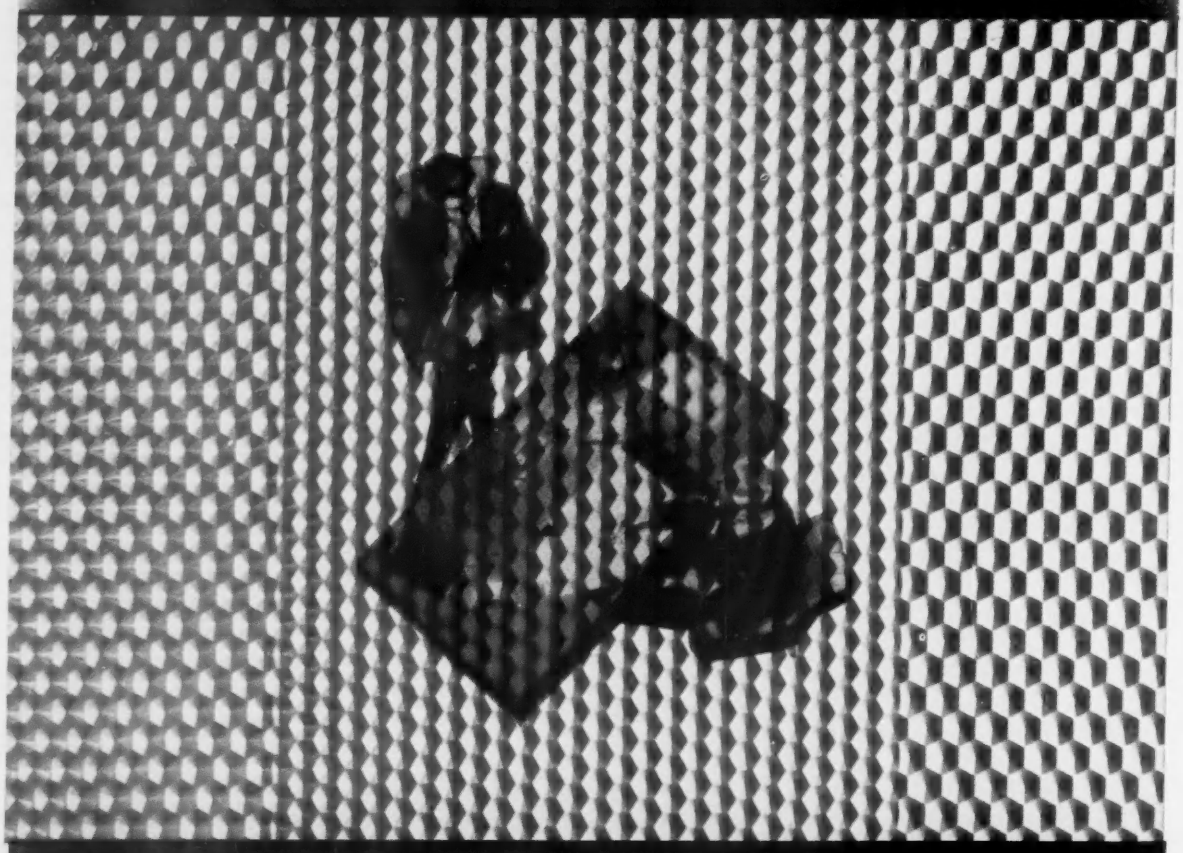
Combined Operations

These famous 'hands and drums' are the symbol of the massive resources of Henley Cables, Siemens Ediswan and Liverpool Cables—combined in the new AEI Cable Division. The illustration shows drums from Henleys, and Siemens Ediswan and the new AEI cable drums, on the job at the Staythorpe 'B' Power Station now under construction. At Staythorpe, AEI are supplying some 110 miles of cables. The contract includes the supply and installation of auxiliary, control and instrument cables and earthing for 3 AEI 120 MW re-heating turbine generators. **You can rely on AEI.**

AEI **CABLE DIVISION**

Associated Electrical Industries Ltd
51/53 Hatton Garden · London EC1
Telephone: CHAncery 6822

IF FLUORESCENT TUBES COULD ONLY SEE . . .



they might find themselves peering down through this while their progeny, the little lumens, become white with heat. For confinement to precise lines of conduct is enough to make any lumen glow.
Holophane, through their scientific systems of prismatic control, bring to fluorescent lighting a unique approach. where brightness is controlled and high utilization of light sources is achieved. Light is where you want it—on the working plane—and not in the eyes. Write for latest Holophane lighting catalogues, without obligation.

SCIENTIFICALLY CONTROLLED LIGHTING

HOLOPHANE LIMITED ELVERTON STREET
WESTMINSTER LONDON S.W.1. Phone: VICtoria 8062

designed for

dependability

The Model 8 is a high-sensitivity version of the Universal AvoMeter, having **a sensitivity of 20,000 ohms per volt on all d.c. ranges, and 1,000 ohms per volt on a.c. ranges from 100V. upwards.** Accuracy on d.c. current ranges and a.c. ranges is to B.S. Specification 89/1954 and on d.c. voltage ranges within 2 per cent. of indication from full scale to half scale deflection, and 1 per cent. of full scale value below half scale deflection.

In addition to the many well-known AvoMeter features, such as the automatic overload protection device, dual-knob range selection, etc., it has a push-button for reversing the polarity of the movement to obviate the inconvenience of changing over the leads when encountering opposite potentials in respect to a common reference point.

VOLTAGE AC/DC: 25mV. to 2,500V.

CURRENT AC/DC: 0.5 microamp to 10 amp.

RESISTANCE
0-20 megohms with internal batteries.
0-200 megohms with external D.C. supply

DECIBELS: — 15 Db to + 15 Db.

Size: 8⅛in. x 7¼in. x 4½in.
Weight: 6½lb. (including leads).

List Price
£23 . 10s.

Fully descriptive pamphlet on application

Sole Proprietors and Manufacturers: AVO LTD

AVOCET HOUSE · 92-96 VAUXHALL BRIDGE ROAD · LONDON · S.W.1 · *Telephone: VICtoria 3404 (12 lines)*

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PERFORATED MILD STEEL

CABLE TRAYS

provide a continuous chassis for the efficient attachment of cables and wires. With the Cable Trays once in position, subsequent alterations and additions to the wiring can be speedily effected at minimum cost, without drilling or plugging.

Trays and bends are available from 2 in. to 36 in. wide; the standard length of trays is 8 ft.

Strongly constructed of mild steel plate, and supplied self-colour, painted, hot-dip galvanized or plastic coated as required.

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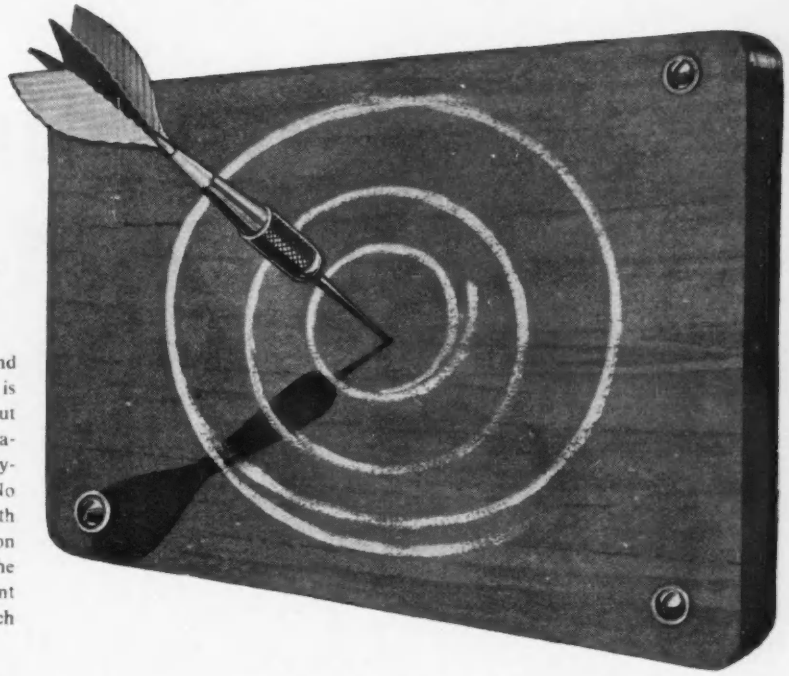
P/6



Wootton meter boards score every time!

Bound to . . . if they're Wootton-made . . . and Wootton-tested! Only the stoutest plywood is good enough for Wootton. Every piece is put to the test. For reliability, toughness, durability, Wootton meter boards stand up to anything. Even in the most extreme climates. No contraction or expansion or warping with Wootton! Oh, and there's more to Wootton than just meter boards. They're right on the target with wood blocks too, and instrument cases, and they're brilliant at sunk switch boxes.

WOOTTON–the meter board people

WOOTTON & CO. LTD
ALMA WORKS · PONDERS END · MIDDX
Telephone: HOWard 1858

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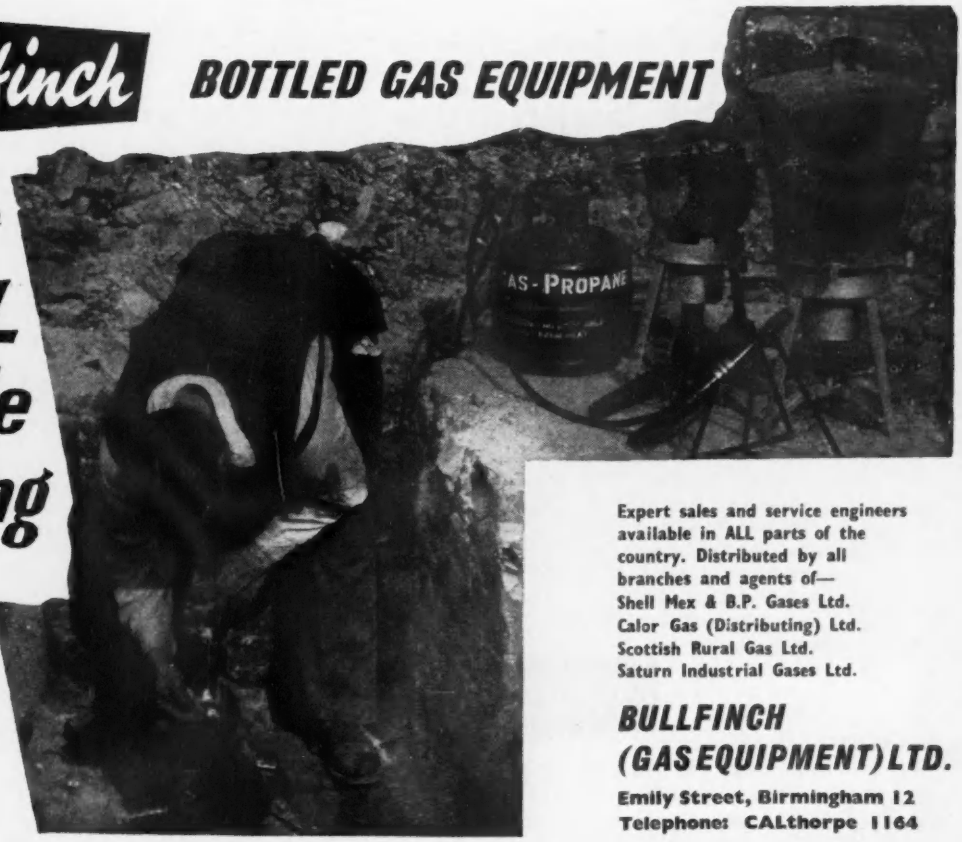

for ALL cable jointing

Photograph by courtesy of the London Electricity Board

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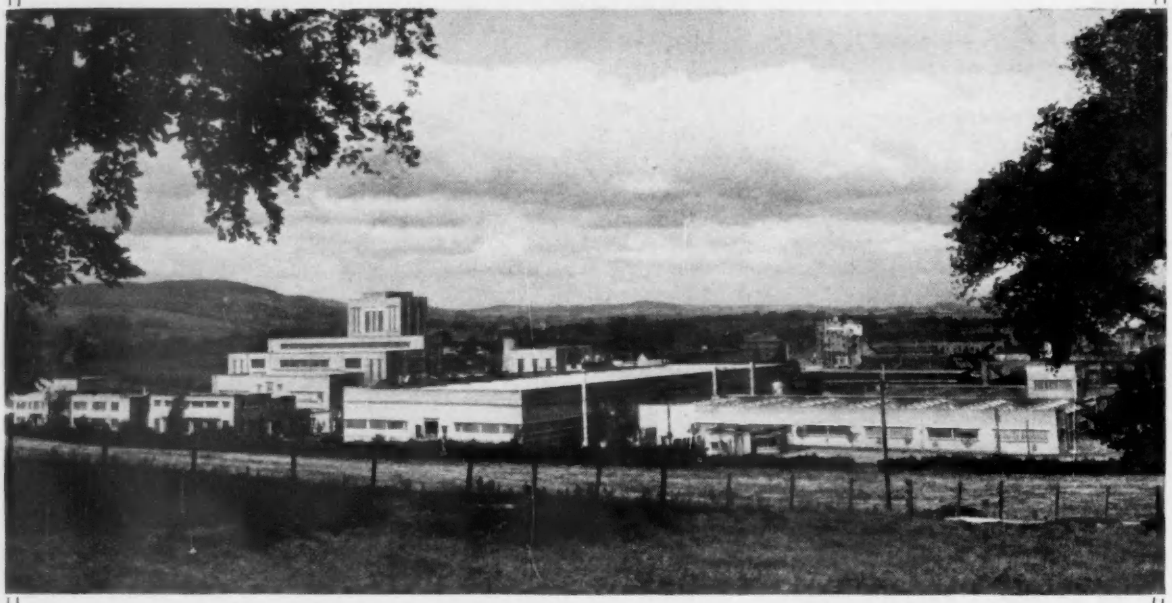
More 'Melinex' in 1961



I.C.I. build new plant to produce 2,000 tons of 'Melinex' film per year

IN JANUARY 1961, a new 'Melinex' polyester film plant will start production at Dumfries with a rated capacity of 2,000 tons/year. I.C.I., who are the sole manufacturers of polyester film in this country, have been selling 'Melinex' for some years. The demand has increased rapidly and I.C.I. have been allowing imports of American and Continental film to supplement their limited production. The new plant will remove the necessity for such imports.

More and more firms are appreciating the outstanding properties of 'Melinex' film. Its unusual clarity and strength (both mechanical and electrical) combined with its great dimensional stability and resistance to heat and chemical action, are improving a very wide range of products throughout industry.

Where 'Melinex' film is now being used:

The Electrical Industry—in coils, capacitors, cables, recording tapes and loudspeakers.

Drawing Offices—as a flexible, durable and dimensionally stable drafting film.

Display—in metallised form for tinsel and as coloured tapes and panelling.

The Book Trade—for protecting covers and as a base for hot stamping foils.

Footwear & Leather goods—in metallised form for shoes and fashion accessories.

The Food Industry—for improving the sales appeal of goods and for 'boilable' packs.

The range of uses for this versatile film will widen considerably in 1961. If you would like further information or wish to discuss a possible application for 'Melinex' film, please write to I.C.I. Their Technical Service staff will be pleased to give advice and technical assistance.

'Melinex'

'Melinex' is the registered trade mark for the polyethylene terephthalate film manufactured by I.C.I.

ICI

IMPERIAL CHEMICAL INDUSTRIES LIMITED · LONDON · S.W.I

PME I

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manufacture the largest range of servo motors in the world

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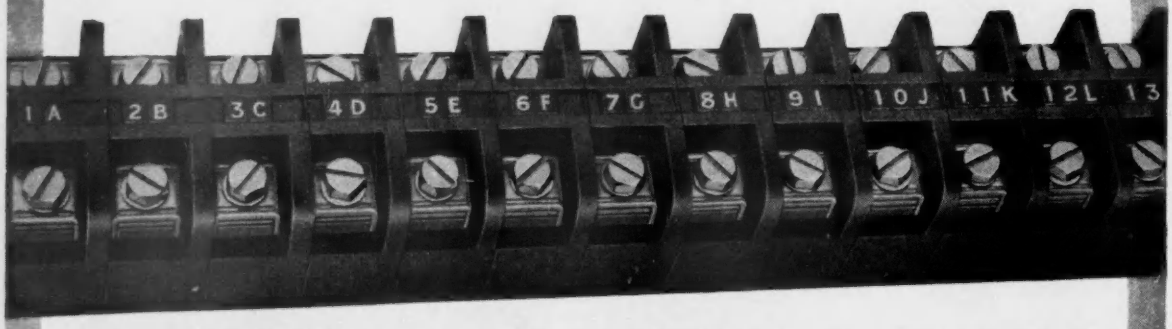
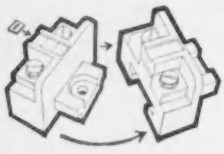


MTE MULTI-LOCK TERMINAL BLOCKS



With Multi-Lock you can build up complete terminal block assemblies consisting of any number of single units you choose. They are available in three ratings (15, 40 and 100 amp.) and can be mounted to any surface without special brackets or channels. The 40 amp. and 100 amp. blocks also interlock with one another to give two different ratings in one assembly. All Multi-Locks meet B.S.I. and C.S.A. specifications.

For *immediate delivery* or further details ring Eastwood 524281.

M.T.E. CONTROL GEAR LTD · LEIGH-ON-SEA · ESSEX

Cut CONTROL GEAR ASSEMBLY COSTS with—

BETA TERMINAL BLOCKS

The Beta Terminal Block has been designed for the simple and economical grouping of any number of ways. Extra ways can be inserted without dismantling or further drilling. Only two fixing screws are required for up to 12 ways. Provision is made for numbering each way individually or in groups. Transparent covers are available if required.
Moulded from high grade electrical quality phenolic material, with terminals and connecting link made from brass- electro-tinned. While conforming to highest electrical and mechanical standards, the size has been reduced to a minimum.

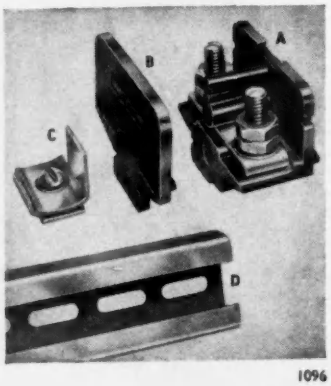
BASIC UNITS

A Body with connecting link and studs.

B Moulded barrier. Required only at one end of group.

C Steel end clamp, one required at each end of group.

D Cadmium plated slotted steel channel.



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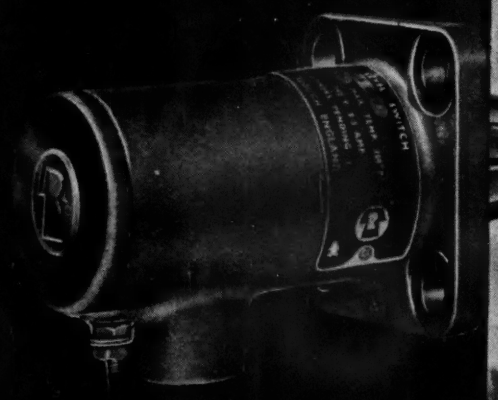
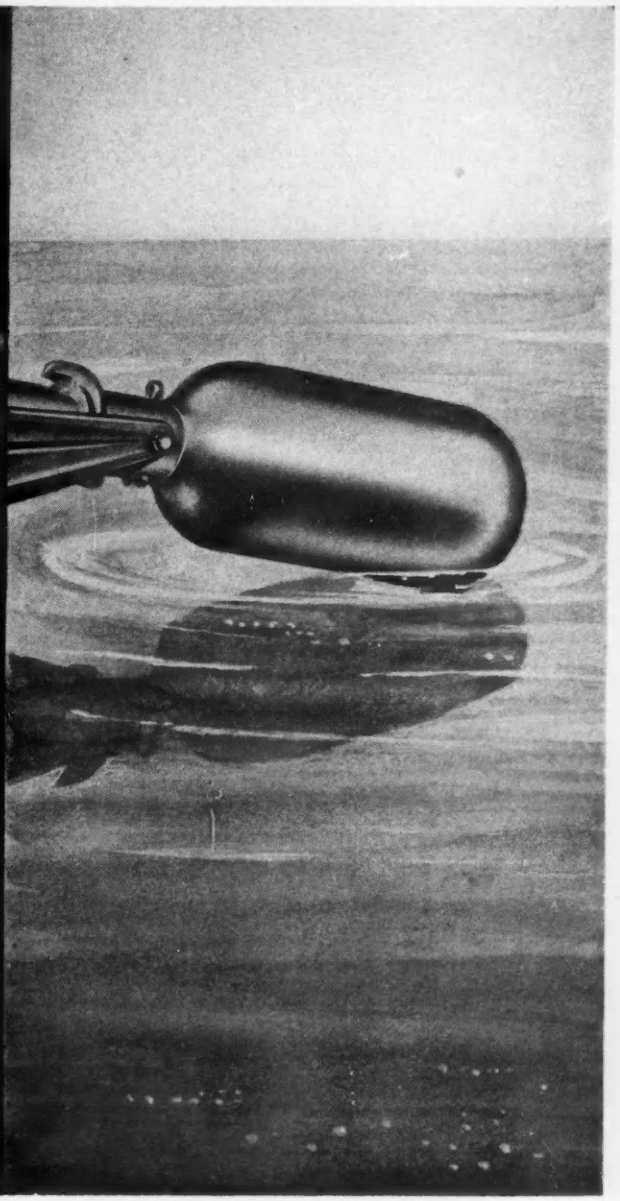
TRIST MAGNETIC SWITCHES





The Mobrey General Purpose Level Switch

RONALD TRIST & CO. LTD.

(a company of the Bell's Asbestos and Engineering Group)

Bath Road, Slough, Bucks

Telephone: 25041 *Telegrams:* Resvalar, Slough

For indicating or controlling liquid level in tanks and similar vessels.
Employed as a high- or low-level alarm its contacts are wired in conjunction with an indicating lamp or some audible warning device.
Used for controlling an electrically driven pump supplying liquid to or extracting liquid from a vessel, its contacts are wired in conjunction with the contactor coil in the pump motor starter.
There are over 100 different types of switch available for use in almost any liquid.

Please ask for Brochure ET.M.160.

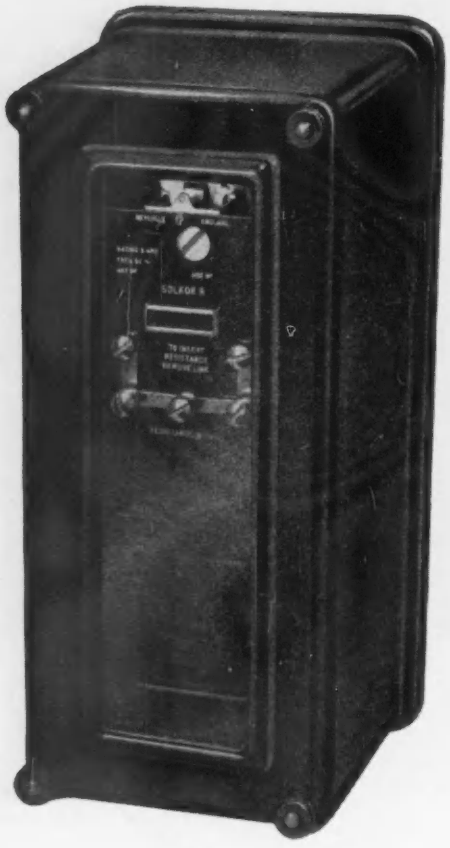
RB

PROTECTION...

Reyrolle ANNOUNCE A NEW PILOT-WIRE SYSTEM

Solkor-R

HIGH-SPEED FEEDER-PROTECTION



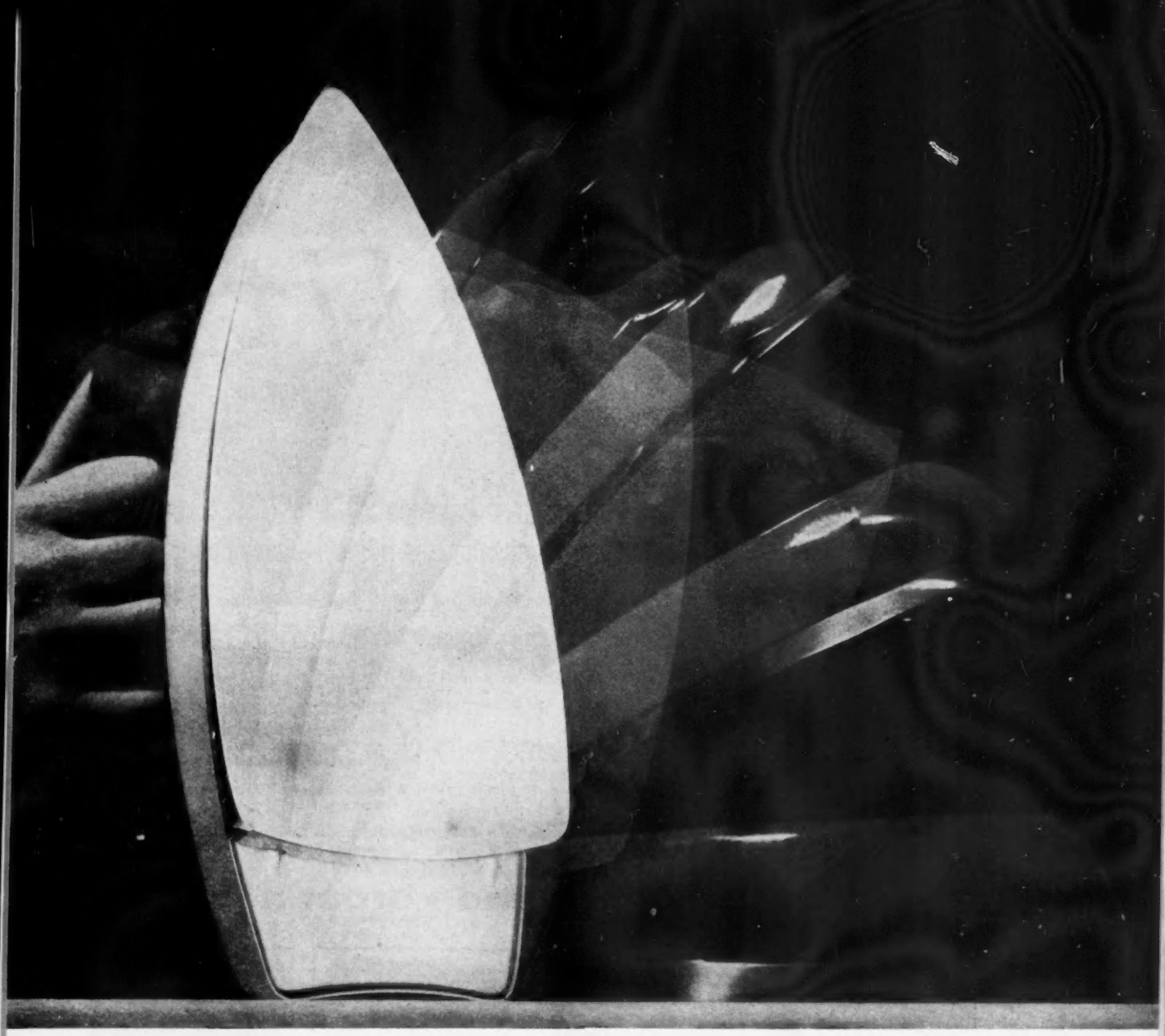
This system is a major advance in the art of feeder protection. It combines the most recent results of protection research with principles which have been well proved in service. Requiring only a single-pole relay and lightly insulated 2-core pilots it is both simple and economical to install, and, being based on static components, its maintenance costs are negligible.

Other features are high-speed operation, high transient stability, low fault-settings, use of ordinary current-transformers, and suitability for pilots up to 1,000 ohms resistance.

Ask for Pamphlet No. 1328

Reyrolle

A. REYROLLE & COMPANY LIMITED - HEBBURN - COUNTY DURHAM - ENGLAND



How to cut out two tons of ironing every week

(a young wives' tale from Canada)

It's an old wives' tale that a good iron must be heavy. Young wives know better. They know that what irons out wrinkles is not weight but heat. So they are turning to the sleek, aluminium irons that are nearly 2 lb. lighter than those made of steel.

A housewife lifts her iron every four seconds while she's ironing. So those two pounds saved add up to nearly a ton of lifting saved in every hour's ironing—two tons in an average week's ironing!

Lightness is only one of the good things about aluminium. Just as important is the fact that aluminium absorbs more heat than steel and conducts it faster. So the aluminium iron is more evenly heated, the work gets done more quickly, with less effort, and less electricity is used in the process.

The Appliance Revolution. Aluminium is bringing many improvements to today's household appliances. It has made vacuum cleaners and floor polishers lighter to carry. Because it is unaffected by water, steam, grease, or dirt, it is being widely used in the new refrigerators, washing machines, clothes dryers and radiators. Aluminium looks good. It *stays* clean, safe and hygienic—especially in food appliances. It won't rust or chip, and in its new anodized forms it can be used in beautiful colours.

How Alcan help. At our laboratories in Britain, Canada, and Switzerland, we are working on new ways to use aluminium in modern appliances and are passing on our discoveries to British appliance makers. Our research has led to better colours, stronger enamels and smoother finishes in many appliances, making them smarter in appearance and easier to clean. We have developed new casting alloys and methods that are leading to new household aids—that will lighten every woman's housework. Behind this research are our world-wide resources that make sure there will be plenty of aluminium at a low price and of the highest quality.

Alcan (U.K.) Limited, Aluminium Canada House, 30 Berkeley Square, London, W.1. Telephone: Mayfair 9721.

Britain's most widely used aluminium

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PHILIPS

streamlite

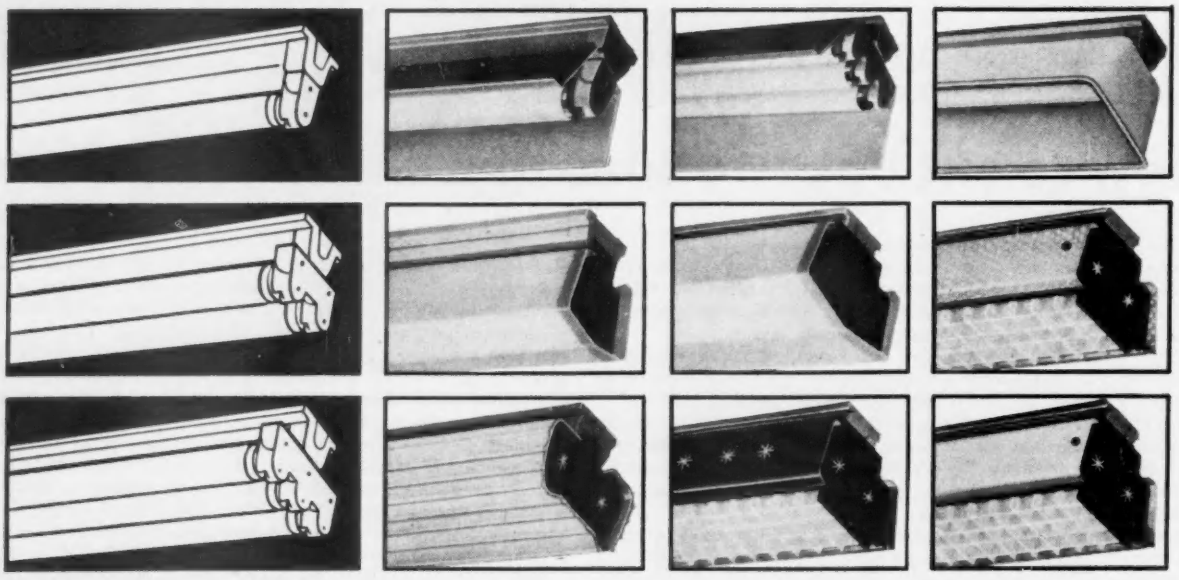
is here!

The newest, slimmest lighting fittings for 1, 2 and 3 lamps 5ft. 80w (1 & 2 lamps 2ft. 20w, 4ft. 40w) — with a big range of reflector and diffuser attachments

Philips Streamlite – it's the newest thing in fluorescent lighting fittings. And it outdates every other type of fitting on the market. For Philips Streamlite – so slim, so sleek, so stylish – has far more to offer than any other fluorescent fittings you can buy, including some advantages that are as unique as they are striking:

- *Philips Streamlite gives you Switch and Switchless start in the popular sizes.*
- *There is a choice of one, two or three lamp fittings – all equipped with Philips even slimmer Polyster ballasts.*
- *There is a fine range of diffusers and reflectors.*
- *It is extraordinarily reasonable in price.*
- *B.S. Box fixing and conduit entries at 24" centres. (B.S. 2467) 2 ft. 20w. 17½" centres.*
- *Variable fixing centres for B.S. Boxes where used with slide-grip hangers.*
- *For single and continuous mounting.*
- *Philips Sprung Rotor lampholders with earth plungers for lamp end-caps – rapid fixing, automatic positioning.*
- *10 amp. mains terminal block, and earth connection.*
- *Full length back plate with rigidly secured cast alloy ends providing earth continuity for end-entry conduit.*
- *Easily removed plastic inserts for end-conduit entries.*
- *Cable way for through wiring: cable cleats provided.*

They'll be in big demand – order now!



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(LD3284J)

COMPACT MODERN STYLING COMBINED WITH SUPER ACCURACY IN THE NEW SUNVIC ROOM THERMOSTAT

the Sunvic Room thermostat — designed for two people

THE HOUSEHOLDER

The householder, for its life long reliability and dust free, cleanline appearance.

THE CONTRACTOR

For you — the Contractor — it is simplicity itself to install.

Here are the details :—

Sunvic room thermostats have an overall range of 54°F. (30°C.) and will control temperatures to a differential within 2°F. (1.5°C.) depending upon precise conditions in the room.

CONSTRUCTION

Contained in robust dust-repelling case. Large, easily connected terminals revealed by undoing a single screw.

ACCELERATION HEATING

Small carbon resistor fitted in thermostat ensures even, comfortable control when the instrument is regulating loads of 8A or less.

INSTALLATION

Only one screw needed to secure the thermostat to the wall-mounting or conduit-box plate.

TYPES AVAILABLE

Can be supplied with a switch, enabling mains circuit to be isolated without altering the thermostat setting. Also available as reverse acting type which breaks auxiliary circuit with a fall in temperature.

AEI

Instrumentation Division
P.O. Box 1 · Harlow · Essex Tel: Harlow 25271
Associated Electrical Industries Limited

SC/102

progress & efficiency

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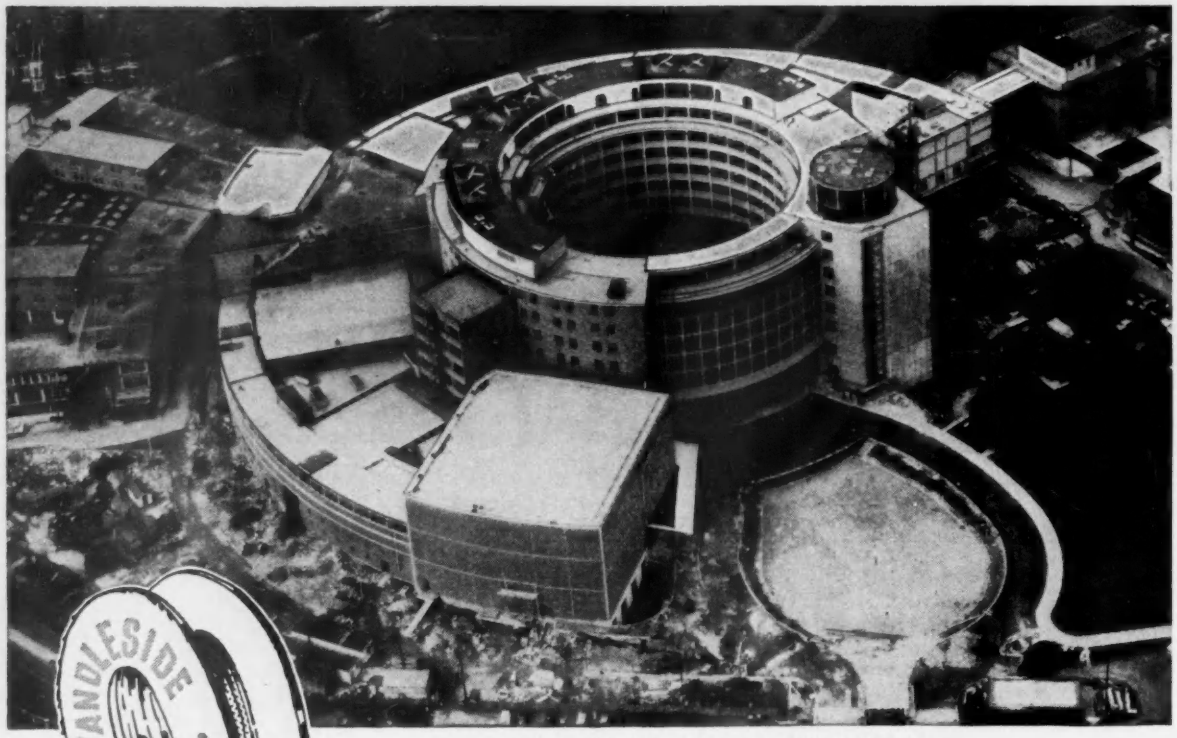
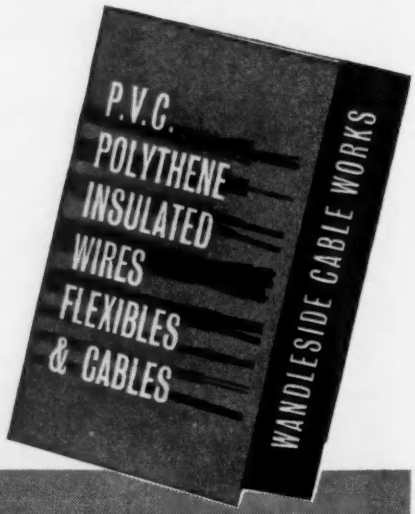
WANDLESIDE CABLES



The new B.B.C. Television centre uses Wandleside Cables.
[Photograph by courtesy of the B.B.C.]

Every type of cable produced in the three factories of the Wandleside Cable Group is subjected to the most exacting tests to comply with the British Standard. Government or other relevant Specification. Reliability is our watchword. This is why you will find Wandleside Cables carrying the load in every major project in the Television, Radio, Electrical, Electronic and Aircraft Industries.

Our new catalogue gives you details and specifications of our range of Thermoplastic Insulated Wires and Flexibles.
We will gladly send you a copy by return of post.



WANDLESIDE CABLES for Radio and Television

WANDLESIDE CABLE WORKS LTD. 106 GARRATT LANE · WANDSWORTH · LONDON · S.W.18
Tel. VANdyke 7544 (7 lines) (in FALKS Group) Teleg: Wandleside, London

PREFORMED TECHNICAL BULLETIN NO. 1

Preformed ARMOUR RODS

are applied very quickly by hand

NO TOOLS REQUIRED

USED THE WORLD OVER

PREFORMED ARMOUR RODS applied to a PREFORMED ARMOUR GRIP SUSPENSION UNIT

The Preformed principle combines maximum holding power with low localized pressure and eliminates fatigue arising from stress concentrations.

In many parts of the world the use of armour rods is standard practice for overcoming troubles caused by the combined forces of periodic vibrations occurring as a result of wind and ice loading and bending at the support, with consequent chafing and abrasion, and, in severe cases, actual fatigue failure of individual conductor strands.

PREFORMED Armour Rods have the following advantages:

1. They are applied without special tools or wrenches. They are placed in position and wrapped on by hand. The conductor cannot be scored or otherwise damaged. The armour has a neat and uniform appearance, irrespective of the skill of the linesman.

2. By using the PREFORMED technique and having the inner diameter of the rod helix slightly smaller than the outer diameter of the conductor, the rods are clamped to the conductor with inherent spring tension. In this respect, the elimination of the defects of wrench-applied armour is most marked, since PREFORMED rods grip the conductor whereas the former tend to spring clear with a consequent danger of chattering between armour rods and conductor. For this reason PREFORMED Armour Rods do not require end clamps.

3. Rigidity is imparted to the installation at the insulator through the certain contact of PREFORMED armour and the conductor, whilst the undue bulk of metal at the clamping point is avoided.

4. Resistance to chafing and abrasion is higher with PREFORMED armour since the alloy rods have approximately twice the hardness of manually-formed armour. They protect the conductor from arc-over burns.

5. In the event of failure of the conductor strands within the armoured part, the gripping forces available with PREFORMED armour maintain the original strength and conductivity of the span.

6. As PREFORMED Armour Rods are not deformed during application, they can be easily removed for purposes of re-sagging the conductor or for use elsewhere.

PREFORMED Armour Rods may be used on conductors of any size and will solve vibration problems by strengthening the conductor at points where damage may be expected to occur. They protect the conductor against flashover damage and they support it over a considerable length at insulator positions, giving a large radius of curvature and relief of stresses in the conductor caused by small clamping plates at suspension insulators and conductor binds at pin insulators. Good flexibility of the conductor is maintained at the clamps.

PREFORMED Line Products also manufacture:

LINE GUARDS—*for conductor protection at insulators*
LINE SPLICES—*full tension joints*
PATCH RODS—*for repair of strands*
DEAD ENDS—*full tension terminations*
GUY-GRIPS—*the most economical way of making-off stays*
ARMOUR GRIP SUSPENSION UNITS—*a revolutionary suspension clamp*
SPLICE SHUNTS—*for overheating joints*
BUNDLED CONDUCTOR SPACER UNITS—*the best twin conductor spacer*

BRITISH PLP

Send for technical brochure available in English, French, Italian, German or Spanish.

PREFORMED LINE PRODUCTS

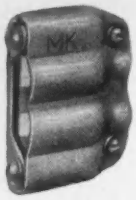
(GREAT BRITAIN) LIMITED

ANDOVER · HAMPSHIRE · ENGLAND. Telephone: ANDOVER 4045

MANUFACTURED UNDER LICENCE FROM PREFORMED LINE PRODUCTS CO., CLEVELAND, OHIO, U.S.A.

AP 19

BOXES AND CLAMPS FOR M.I.C.C. CABLE



CABLE CLAMPS

Cable clamps are suitable for single or twin-core mineral insulated copper covered cable 0.0015 to 0.003 cross-sectional area.

List No. 901—single entry cable clamp.

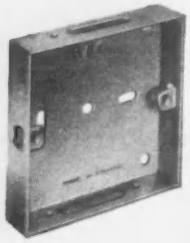
List No. 902—double entry cable clamp.

MK have introduced a new range of boxes and clamps for MICC cable. Single or double entry clamps are interchangeable with any of the boxes and are supplied separately with fixing screws and shakeproof washers. Steel boxes and cable clamps are zinc plated.

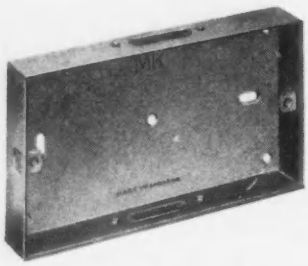
WRITE FOR LEAFLET 257

PLASTER-DEPTH BOXES FOR M.I.C.C. CABLE

These boxes have one clear entry and one knockout for attaching either single or double entry cable clamps.



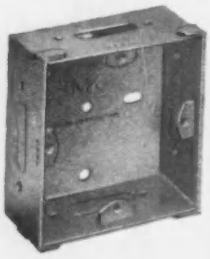
List No. 3951 — Plaster-depth box with 2½" fixing centres.



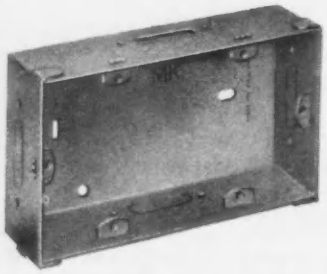
List No. 3952 — Plaster-depth box with 4¾" fixing centres.

DEEP BOXES FOR M.I.C.C. CABLE

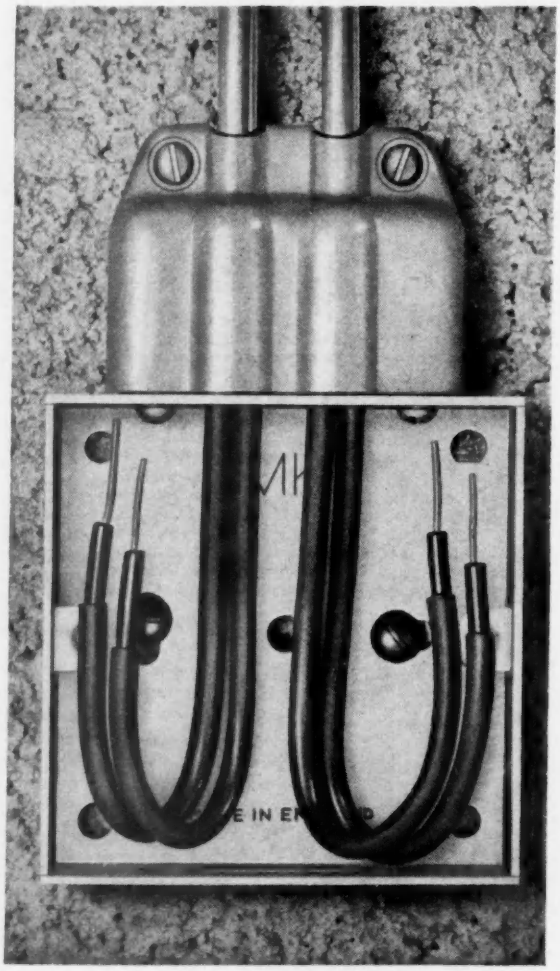
Deep boxes have one clear entry on one side and one knockout on each of the other three sides and one in the back to which can be attached a single or double entry cable clamp.



List No. 881 — Box to BS 1299/1363 dimensions having 2½" fixing centres.



List No. 882 — Box to accommodate any two gang MK accessory.



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ZENITH
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Automatic VOLTAGE REGULATORS

with Electronic Control

A large range of stabilisers is available for installations requiring a constant voltage within ±1% from a supply fluctuating up to ±10% or −15% to +5%.

Single and three phase models from 7 to 25 kVA per phase are detailed in our catalogue which will be sent on request.

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THE AMAZING MULTI-PURPOSE SELF-LOCKING SPRING PIN FASTENER

SAVES: INITIAL COSTS, INSTALLATION COSTS, PRODUCTION MAINTENANCE

Rollpin is a slotted and chamfered cylindrical spring pin, heat-treated for maximum toughness, resilience and shear strength.

Simple to insert or remove, Rollpins exert continuous spring pressure against the sides of the hole, preventing loosening by vibration. Dimensions and elastic limits are specially engineered to give this self-locking action in drillings to normal production tolerances. No reaming or secondary operations are required.

Rollpin can replace . . .
Rivets · cotter pins · stop pins · set screws
taper pins · hinge pins · dowel pins · grooved pins

Illustrated literature available on request.

THE TEMPERED SPRING COMPANY LIMITED

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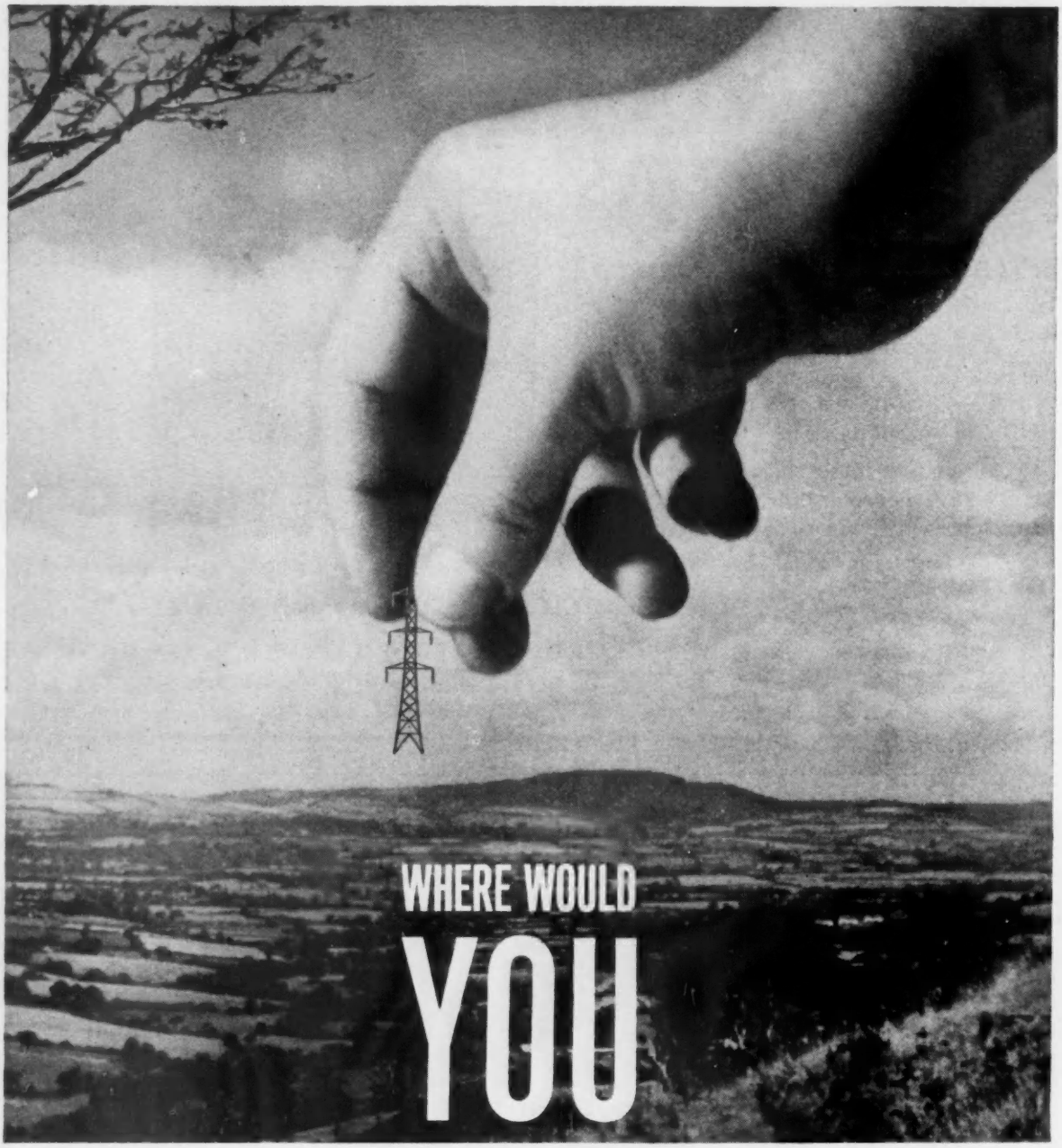

RUN THE PYLONS?

They still live by lamp-light up in the hills. Soon, a new transmission line will thread its way along the valley, bringing the people up on the hill the electricity they've been wanting.

Pylons down here will mean a better life up there. But how will the people of the valley feel about the pylons? And the people who visit the valley?

The Central Electricity Generating Board are just as concerned about this as they are about bringing in the power. For the nation has charged the Board with a double duty. Not only to maintain an efficient, economical electricity supply, but also to preserve the amenities of the country as they go.

Often, these duties conflict. Again and again problems arise which seem impossible to solve. But always, they seek to achieve a balance. A balance between the need to answer demands for more power and the need to preserve the beauty, the intangible values, of a landscape, a village, the still unspoilt approaches to a town.

■ **These advertisements are appearing in the farming and country magazines. The Central Electricity Generating Board thank contractors for their co-operation in the past, and know that they will do all they can, while engaged on work for the Board, to preserve amenities.**

THE CENTRAL ELECTRICITY GENERATING BOARD

CEGB

NEWS SHEET

580 MW Sizewell nuclear station to be built by EE-BW-TW group for £55m. Two reactors will be in single building, with eight boilers feeding two 325 MW turbo-alternators, largest yet. Building starts next April, commissioning planned for 1966. (829, 840)

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Fire inhibiting insulation for generator windings to replace extinguishers, suggested at joint ICE/IEE meeting on Aswan project. Vapours evolved at high temperature as efficient as CO_2. International co-operation on 350 MW project praised. (835)

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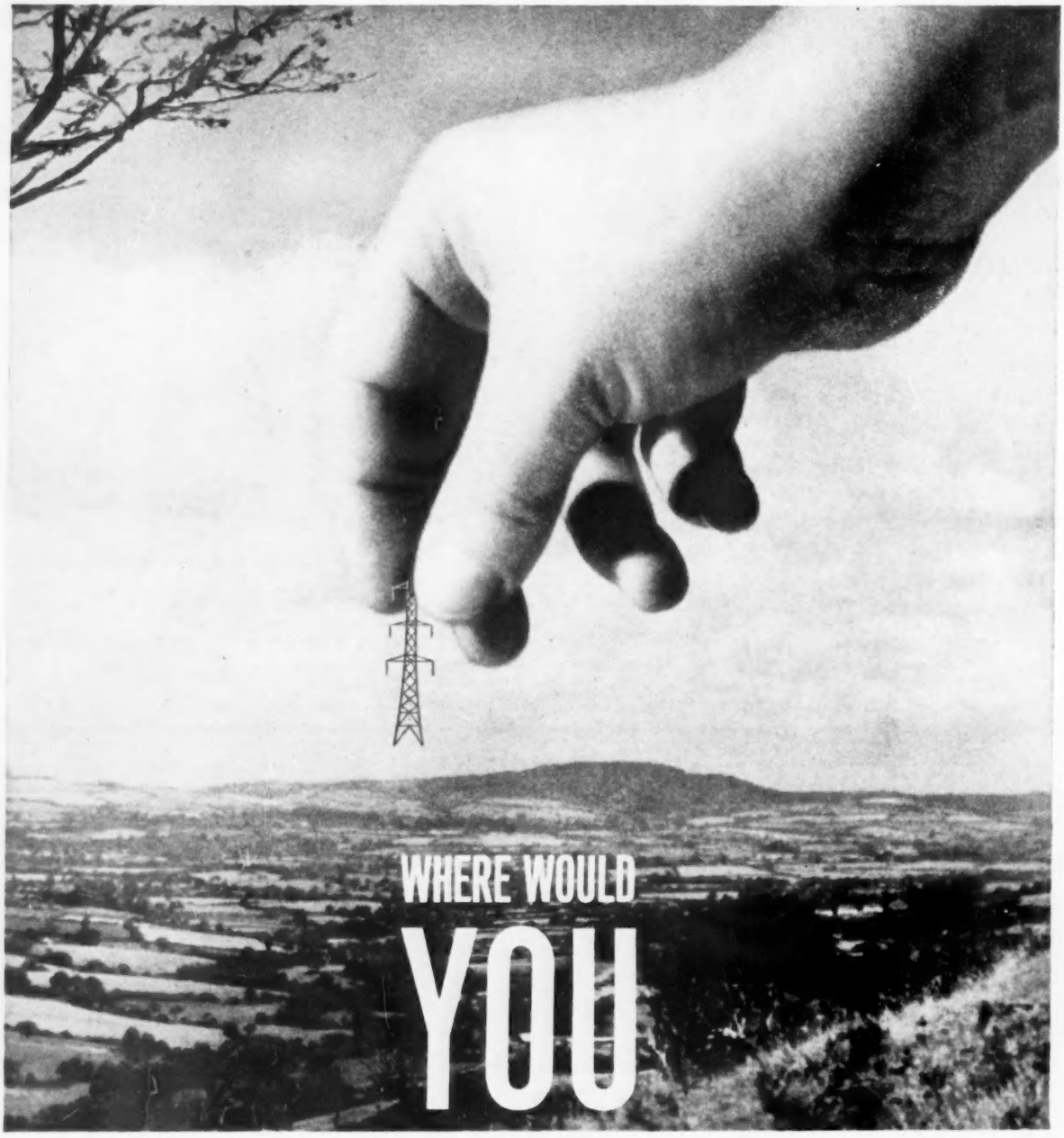

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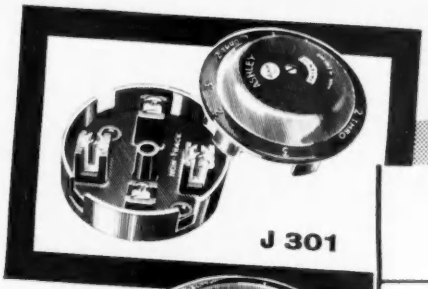

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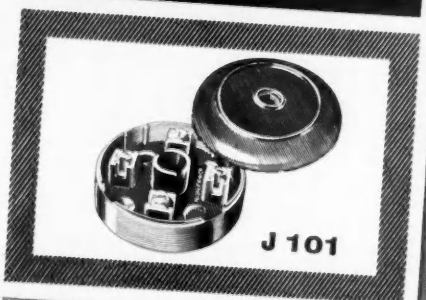

DATA SHEET REF. AJB 1.

JUNCTION BOXES.

ASHLEY SELECTIVE ENTRY JUNCTION BOXES.

SPECIAL FEATURES.

BASE – NON-TRACK REINFORCED BASE. LOW SIDE WALL FOR ACCESSIBILITY WITH FOUR OPEN ENTRY SLOTS.

TERMINALS- HEAVY SLOTTED SQ. BRASS BLOCKS SECURELY LOCKED IN POSITION. EASILY WIRED.

COVER – WITH INTEGRAL SELECTIVE SHUTTERS, CLOSING ANY UNUSED ENTRY SLOTS IN THE BASE. COVER EDGE MARKED WITH 'ENTRIES OPEN' POSITIONS. COVERS ARE SECURED BY A SINGLE CAPTIVE COVER SCREW, EXCEPT J305 & 306 WHERE A SINGLE WOODSCREW SECURES COVER & BASE TOGETHER ON WOOD MOUNTING SURFACE.

CAT Nº	RATING	TERMLS	CABLE ENTRY TERMLS.	CABLE ENTRY COVER.	OVERALL DIMNS DIA.	OVERALL DIMNS HT.	FXG CRS.	COLOUR	DOZ LIST.
J301	20 AMP/	4	3×7/029	EACH SLOT	3⅛"	1⅓2"	2"	BROWN.	23/-
J302	250 VOLT.	4	OR	UP TO	"	"	"	CREAM.	26/-
J303		NONE	2×7/036	2×7/036	"	"	"	BROWN.	18/-
J305	20 AMP/	4	AS	AS	3⅛"	1⅓2"	2"	BROWN	23/-
J306	250 VOLT	"	J301	J301	"	"	"	CREAM	26/-
J501	"	5	"	"	3½"	1⅓2"	2"	BROWN.	31/-
J502	"	"	"	"	"	"	"	CREAM	32/-
J601	"	6	"	"	3½"	1⅓2"	2"	BROWN.	33/-
J602	"	"	"	"	"	"	"	CREAM.	36/-
SPUR BOXES.									
J401	30 AMP/ 250 VOLT.	3 IN LINE	2×7/044 OR 3×7/036 OR 4×7/029	4 SLOTS EACH PASSING UP TO 2×7/044 FLAT TWIN T.R.S.	3½"	1¼"	2"	BROWN	37/8

ASHLEY JUNCTION BOXES-PLAIN COVER & KNOCKOUTS.

SPECIAL FEATURES.

BASE — NON-TRACK REINFORCED BASE.

TERMINALS- HEAVY SLOTTED SQ. BRASS BLOCKS SECURELY LOCKED IN POSITION.

COVER – LARGE COVER PROVIDED WITH KNOCKOUT & GRIP TO ACCOMODATE FLEXIBLE CORD, ENABLING THE BOX TO BE USED AS A CEILING ROSE.

CAT Nº	RATING	TERMLS	CABLE ENT UP TO:-	KNOCK-OUTS.	OVERALL DIMN. DIA.	OVERALL DIMN. HT.	FXG CRS	COLOUR	DOZ LIST.
LARGE- COVER SECURED BY THREADED INTERNAL BOSS.									
J101	20 AMP/	4	2×7/029	4	2⅞"	1⅛"	2"	BROWN.	21/-
J102	250 VOLT.	4	"	"	"	"	"	CREAM.	24/-
J103		NONE	"	"	"	"	"	BROWN.	16/-
SMALL- SINGLE CAPTIVE COVER SCREW.									
J201	20 AMP/	4	2×7/029	4	2⅝"	1"	1¼"	BROWN	19/8
J202	250 VOLT.	4	"	"	"	"	"	CREAM	22/8
J203		NONE	"	"	"	"	"	BROWN	14/8

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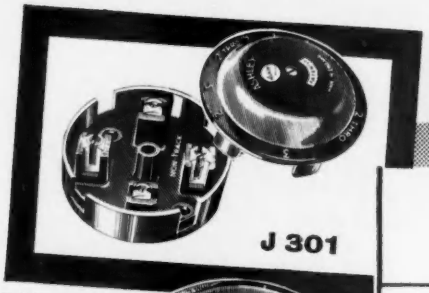
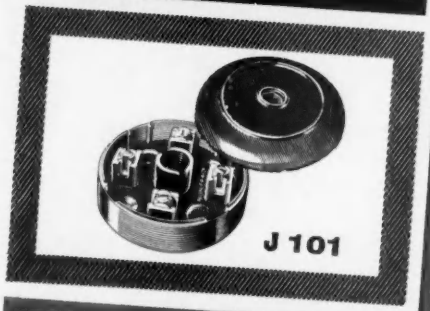

J 301

J 601

J 401

Ashley


J 101

J 201

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J301	20 AMP/ 250 VOLT.	4	3 x 7/.029 OR 2 x 7/.036	EACH SLOT UP TO 2 x 7/.036	3⅛"	1 31/32"	2"	BROWN.	23/-
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J303		NONE			"	"	"	BROWN.	18/-
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J103		NONE	"	"	"	"	"	BROWN.	16/-
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J202		4	"	"	"	"	"	CREAM	22/8
J203		NONE	"	"	"	"	"	BROWN	14/8

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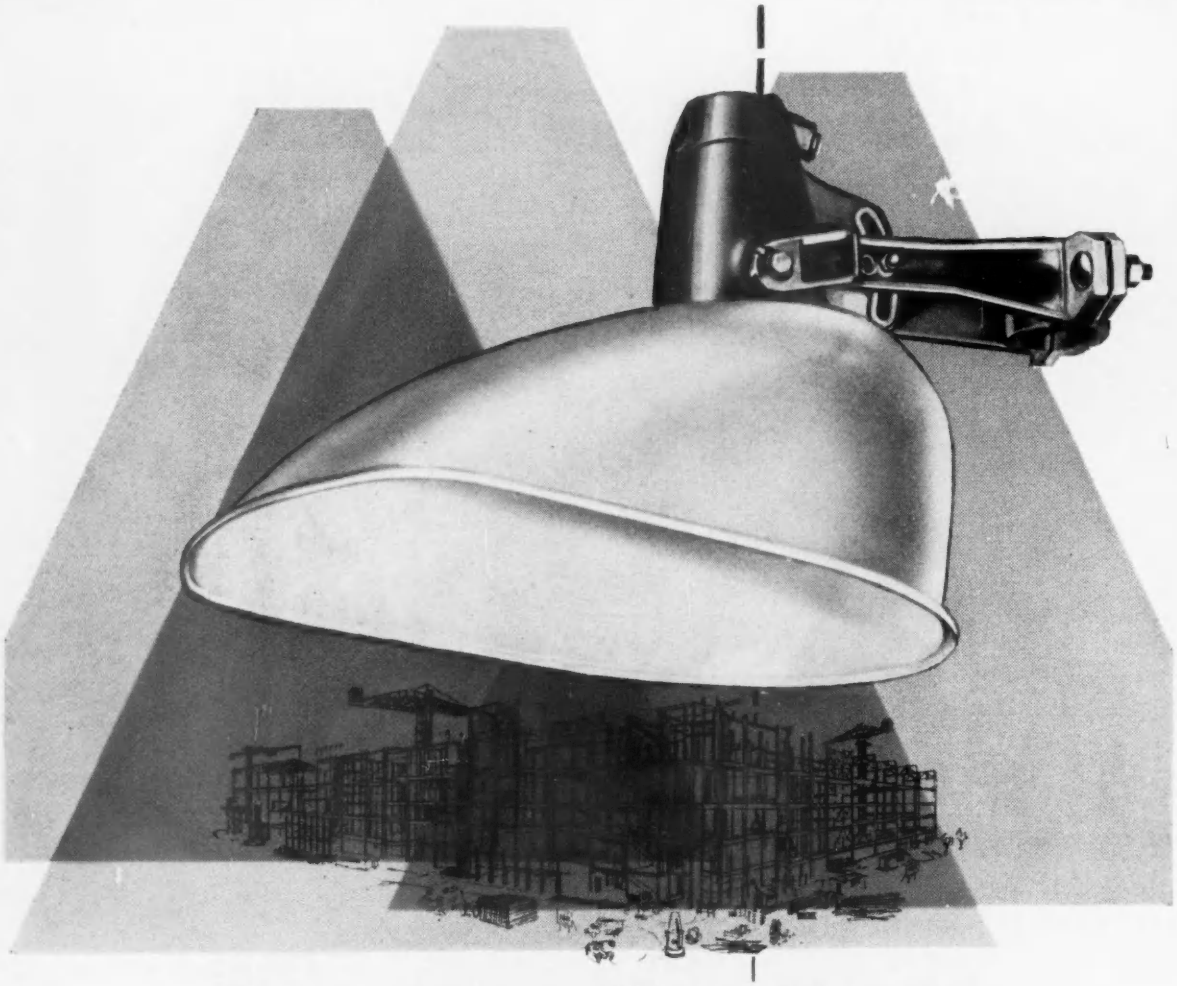
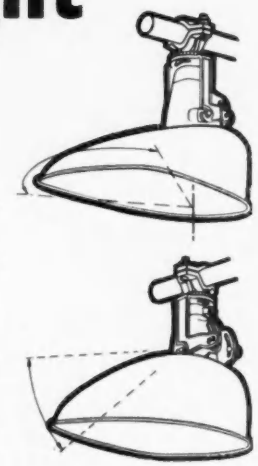


New area floodlight

. . . The Simplex Junior Reflecto Flood with six brighter-than-ever features ★ Low price ★ Fully weatherproof ★ Easily fitted to horizontal or vertical poles or by new Simplex bracket arrangements direct to wall ★ Adjustable cast aluminium brackets for precise angling of reflector ★ Lampholder and connections protected by die-cast aluminium body ★ Acid and alkali resistant vitreous enamelled reflector.
The Simplex Junior Reflecto Flood is suitable for 300/1500 WGLS or 125/700 W Mercury discharge lamps and is available in red, yellow, blue, grey or white.
Price from £10 10 0 complete in carton with bracket.



The Simplex reflector can be adjusted to the required angle.

ELECTRICAL DIVISION

Simplex

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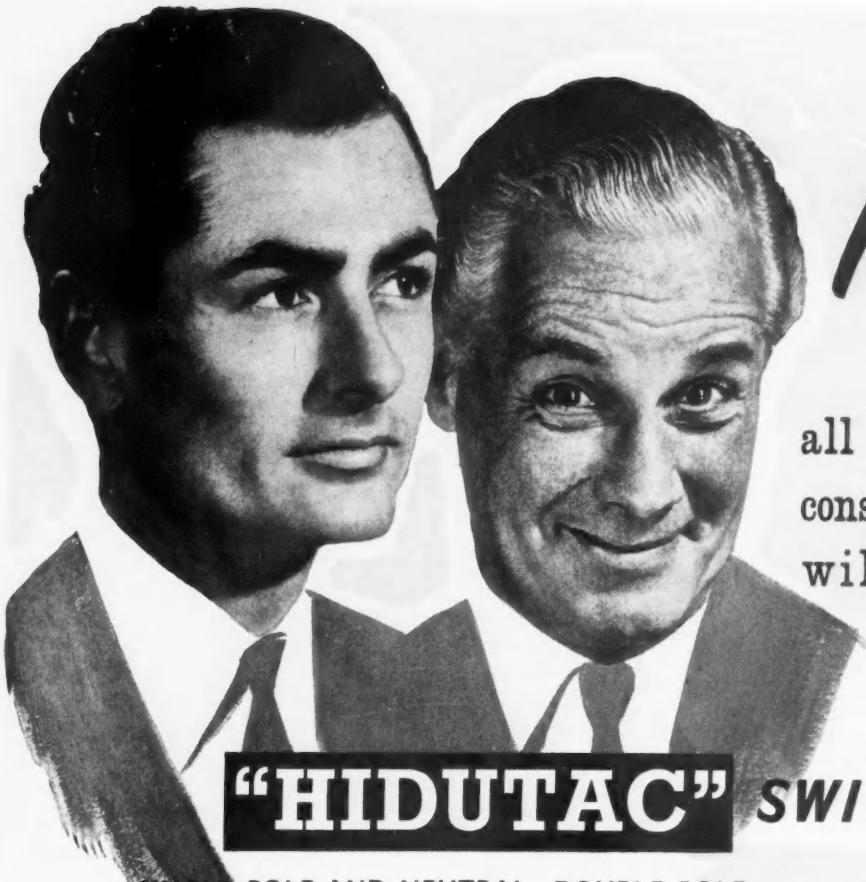

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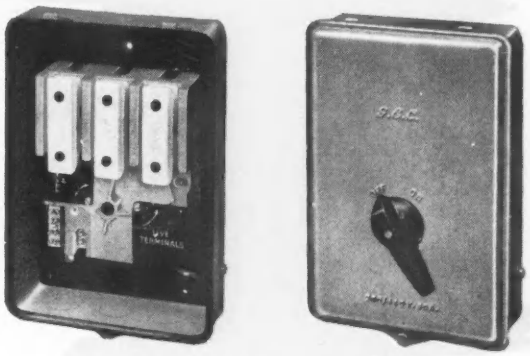
all contractors and consulting engineers will want to use these *NEW*

"HIDUTAC" SWITCHFUSES

SINGLE POLE AND NEUTRAL – DOUBLE POLE – TRIPLE POLE – TRIPLE POLE AND NEUTRAL

Men whose business it is to assess and advise are quick to appreciate the very real advantages offered by G.E.C.'s new Hidutac switchfuses. Unlimited full load switching. High breaking capacity. High fault current protection. Absolute safety. These are the performance features that the experts like so much, but they also welcome the smaller size and the good looks of this advanced range of switchfuses. As it is made by G.E.C., they naturally take its reliability for granted.



15, 30 or 60 amp. 440 volt a.c. Single Pole and Neutral, Double Pole, Triple Pole, Triple Pole and Neutral Switchfuses with interchangeable H.R.C. or rewirable fuses.

G.E.C.

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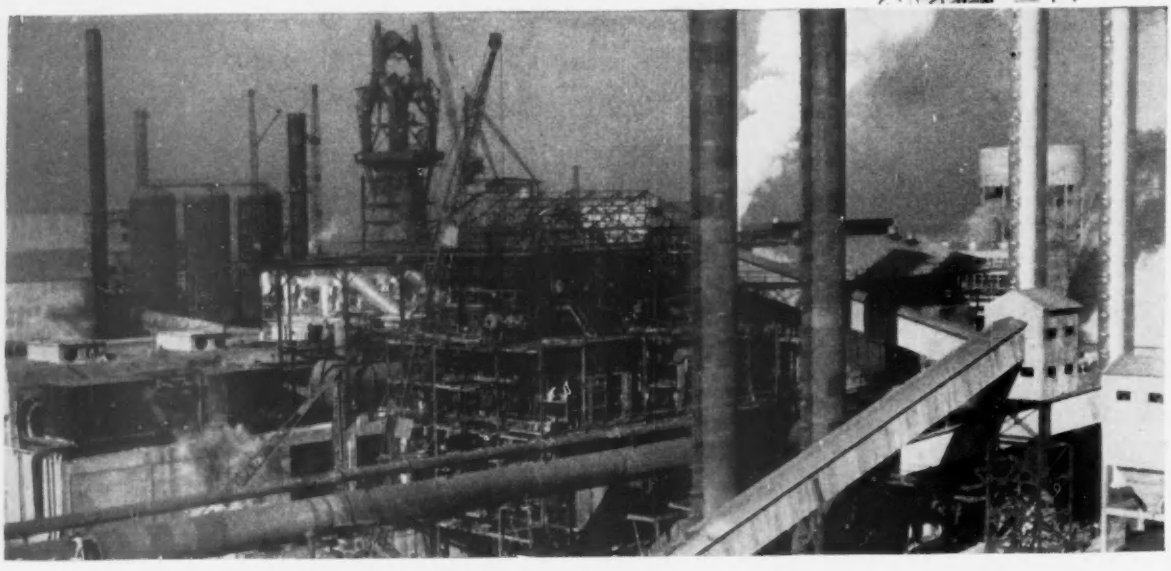
THE POWER BEHIND THE GODDESS

The Steel Goddess was the description given recently to the new Durgapur steelworks. This was apt not only because of its immense importance to Indian steel, but also because Durgapur means 'the place of Durga' and Durga is the ten-armed Goddess of Bengal.

The power behind the annual production of one million ingot tons of steel is one of our many responsibilities at Durgapur. The Goddess's heart, the power plant, consists of four Simon-Carves water-tube boilers producing steam for vital steelworks services; the associated fuel and ash handling plants, cooling system and steam distribution network are all Simon-Carves designed and built.



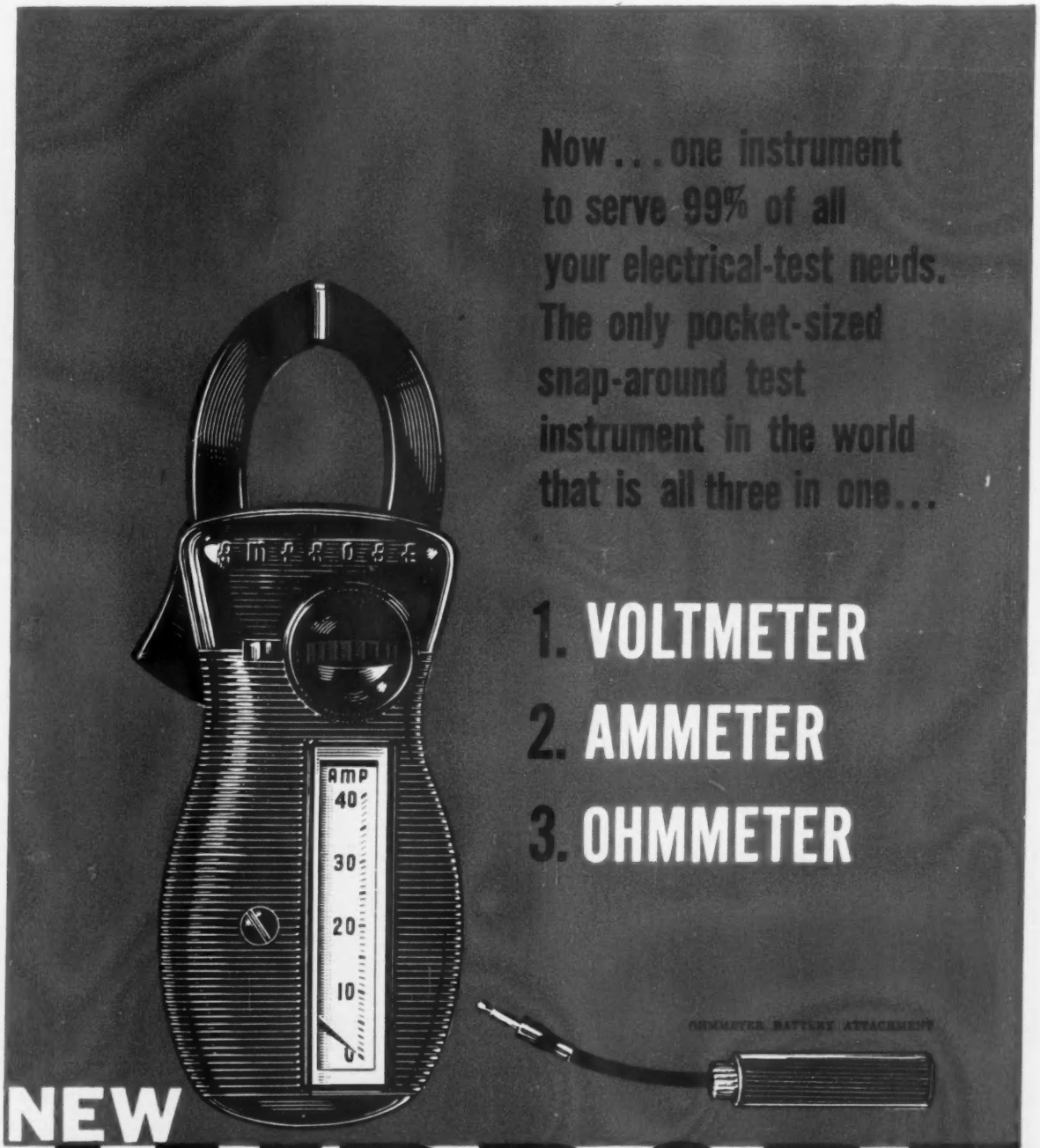
COMPLETE POWER PLANT BY ***Simon-Carves Ltd***

STOCKPORT, ENGLAND

and at CALCUTTA · JOHANNESBURG · SYDNEY · TORONTO

At Durgapur we are also building the coke ovens and coke handling plant, the by-product plant, the coal washery, blending and handling plant and the inter-connecting services for gas, tar and steam.

SC 235



AMPROBE

RS-3

The new AMPROBE RS-3 is the only snap-around, electrical-test instrument in the world that precisely measures current, voltage and resistance. It traces circuits, tests for opens, checks relays, armatures, field resistances...in fact, it accurately meets 99.9% of *all* your electrical-test needs. The RS-3 has five current ranges: 0/5/15/40/100/300 amps; three voltage ranges: 0/150/300/600; and an ohmmeter range with 25 ohms midscale. It comes complete with ohmmeter attachment, voltage test leads and genuine cowhide leather case—all for a price you'd expect to pay for testers which only perform two functions. For more details, see your distributor today or write to:

PYRAMID INSTRUMENT CORPORATION
SALES DIVISION
H. J. BALDWIN & COMPANY LIMITED
NOTTINGHAM — LONDON

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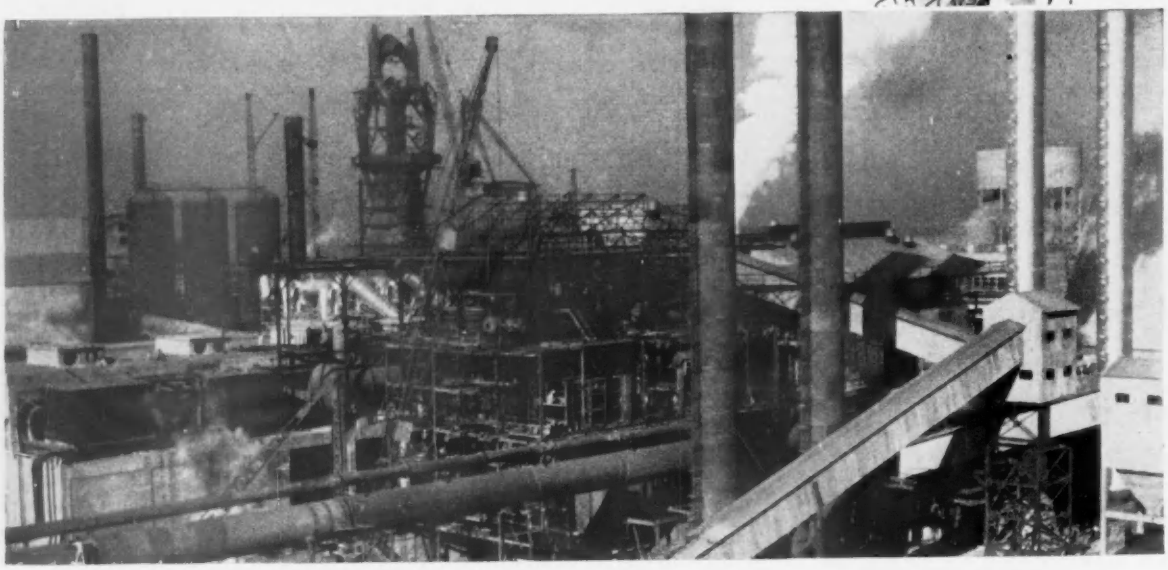

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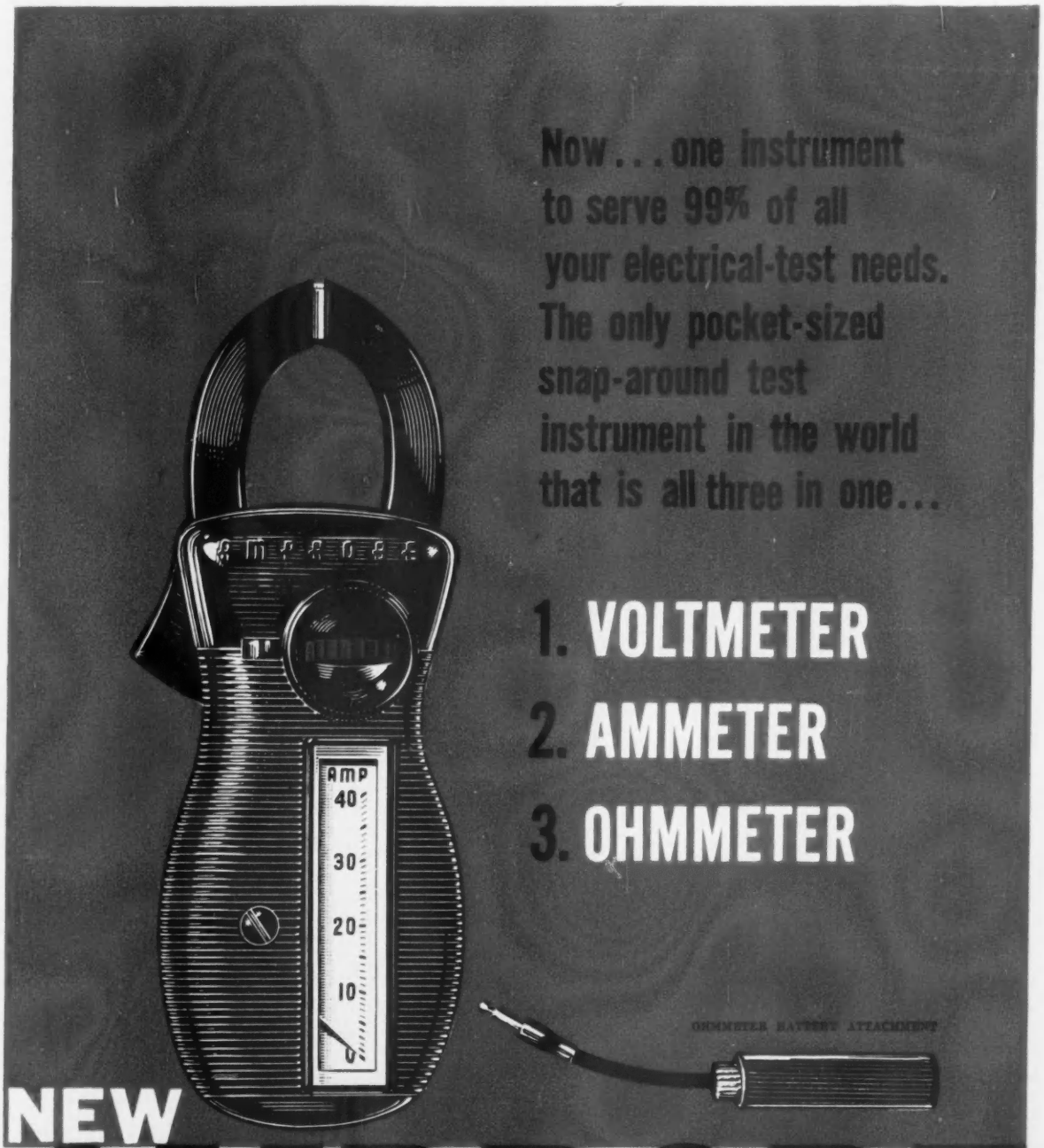

NEW AMPROBE RS-3

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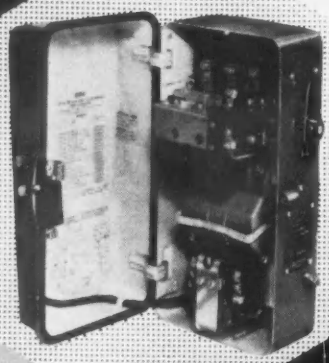

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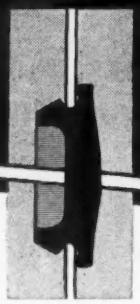
A new Grommet development

THE DOUBLE SEALING EMPIRE RUBBER GROMMET

infinitely accommodating in use:
considerably reduces range of sizes
because the same grommet can be used with
several plate thicknesses or cable sizes



PAT. APP. No. 5255/59

This newly developed self-conforming grommet, because it is immediately self-locking against the elements, is the solution to many of an engineer's sealing problems.
Any one size will not only accommodate itself to a variety of mounting plate thicknesses, but (designed for cable or control rod) will take these in a variety of sizes and be weather-, water- and dust-proof at a variety of angles to the cable or rod.

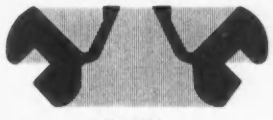
Because of its capacity to conform to many varying requirements, it enables a workshop stock range of grommets to be reduced to perhaps one tenth of that at present maintained.

THE NEW BLIND GROMMET

FREE

Note how when sprung into position the grommet provides a perfect double seal by its own permanent pressures. The angled groove also creates a tight pressure hold on the metal plate.

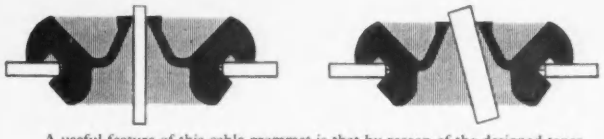
THE NEW DESIGNED GROMMET



FREE

FITTED

In the cable grommet variety the same double pressure seal is created, allied to tight seal on various diameters of cable. This new grommet gives sound sealing at *all* vital points.



A useful feature of this cable grommet is that by reason of the designed taper of the cable entry and the flexibility of the web, a considerable angle of cable entry and a variety of cable size are possible. This avoids necessity for special grommets with angled bores.

In the conventional grommet, only one thickness of plate and only one size of cable can be accommodated. No effective seal is afforded by the parallel groove.

Now being produced in a range of sizes.

THESE GROMMETS WILL SOLVE
YOUR SEALING PROBLEMS.

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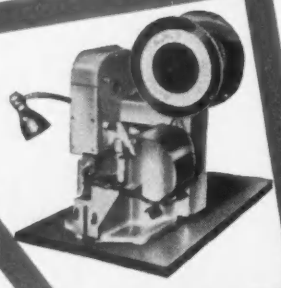
Prestcold use

*AMP

*FASTON receptacles



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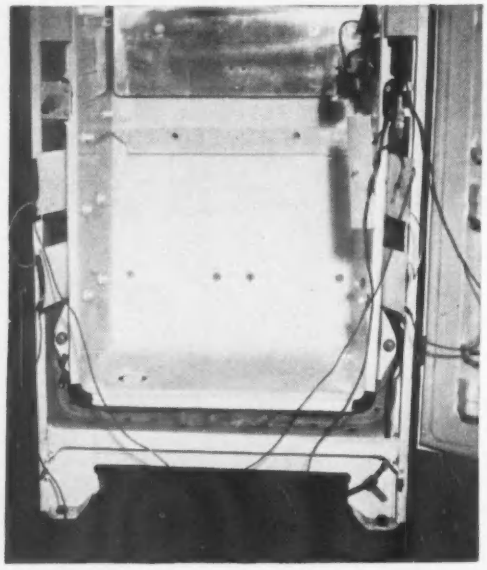
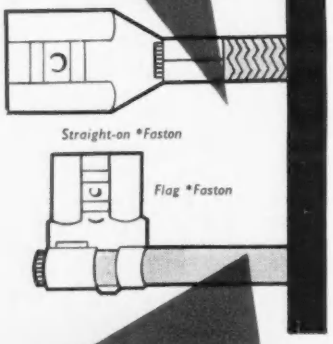


The illustration shows refrigerator harness employing *"Fastons" for quick and easy assembly.



Straight-on *Faston

Flag *Faston

Refrigerator photograph by courtesy of the "Prestcold" Division of the Pressed Steel Company Limited.

. . . to the end

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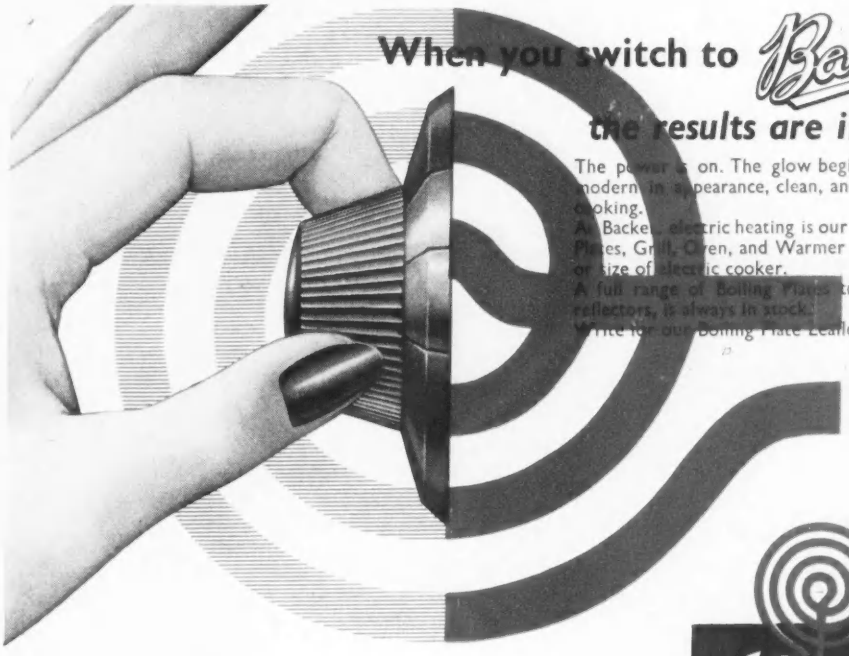

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The power is on. The glow begins. Backer Radiant Boiling Plates are modern in appearance, clean, and quickly reach red heat for efficient cooking.

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Illustration shows Automatic Stator-Rotor Starter with two-step rotor starting with built-on isolator and flush mounting ammeter with signal lights.

This range of automatic stator-rotor starters is suitable for controlling slip ring motors up to 40 h.p. on 380/440 volts, three-phase supply, and utilised in their construction are our now famous heavy duty contactors, which are fitted with solid silver contacts, air-break; the solenoid assembly only is oil-immersed, but NO MAINTENANCE IS REQUIRED. This unique design prevents contact bounce by controlling the speed of the contact make and break, thereby increasing the contact life considerably. No other contactor has this feature.

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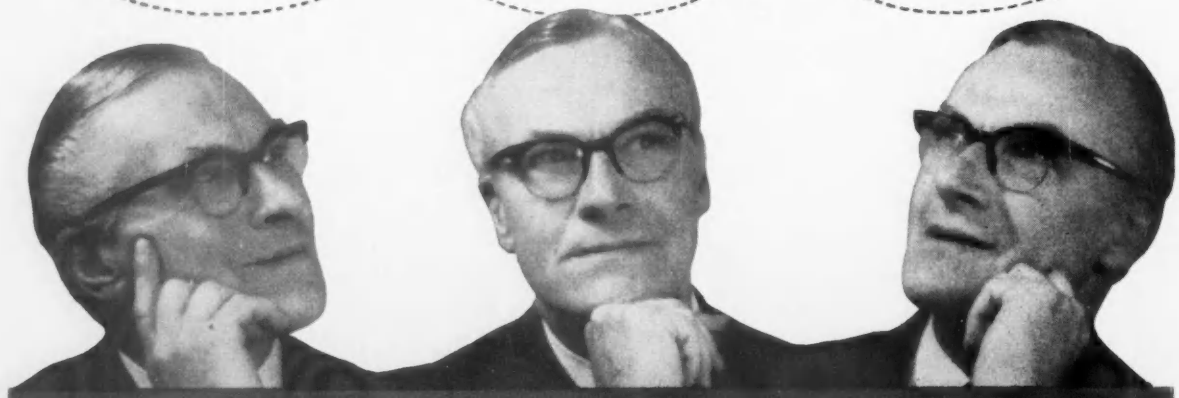
'GIVE THEM LONGER SERVICE LIFE'

'LOWER MY MAINTENANCE COSTS'



...and BROOKHIRST IGRANIC made them come true

with a new range of starters (for all induction motors) that are also lighter, more compact, safer, better than ever — designed to outlive the motor.

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* Wide-fronted front removal cover.
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* Vertical dust-safe contacts.
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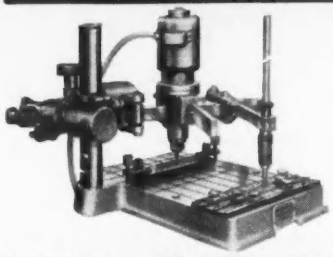

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Reduction range 1:2 to 1:4 Vertical adjustment to suit workpiece height. Area for 1:2 reduction 5in. by 3in., for 1:4 reduction, 2½in. by 1¼in. £95 Complete ready for use

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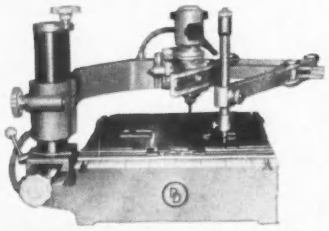

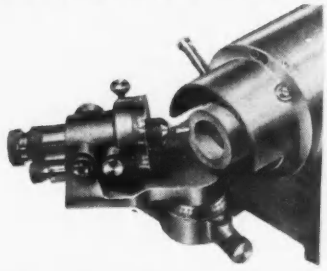

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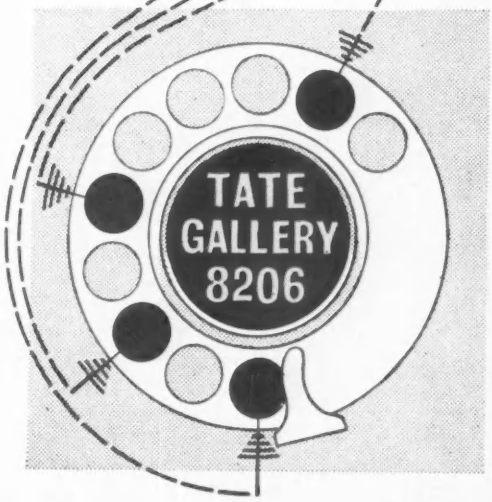

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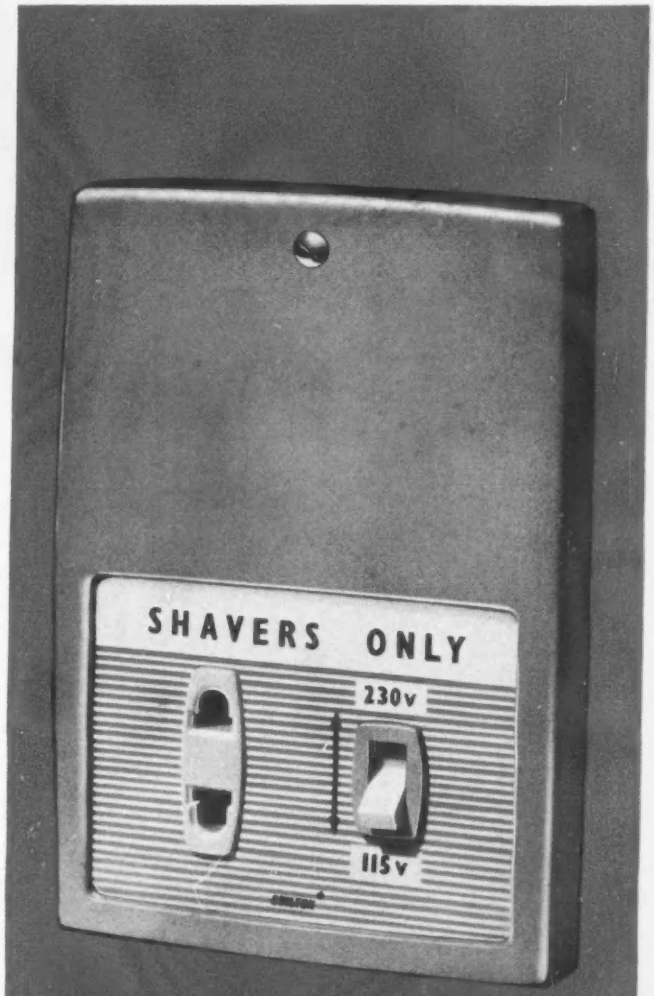
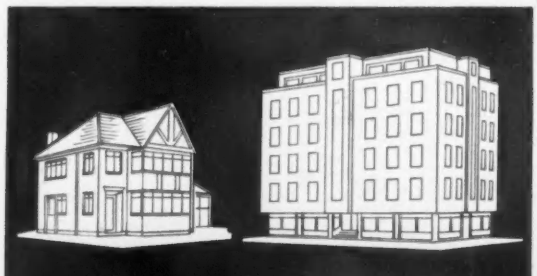


CHILTON MK. IV ELECTRIC SHAVER SUPPLY SOCKET



MK. IV DUAL VOLTAGE UNIT

Supplies either 230v or 115v power source from a single socket, selected by single-pole voltage switch. Fed from secondary winding of 20-watt double-wound transformer with separate primary and secondary windings. Single socket takes British 5 amp, Continental 6 and 10 amp and American 15 amp (flat-pin) plugs. In light-grey plastic with fascia lettered in black.

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CHILTON

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"ATCOTROL 304"
A percentage Timer operating on a continuous cycle to control temperatures by interrupting the heating circuit at regular intervals. For all types of electrically heated equipment such as ovens, driers, furnaces, evaporators and the like. Contacts can deal directly with loads up to 4·5 kW. Range up to 60 seconds.

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An Auto-Reset Timer operating on a single-cycle duty and will control up to six individual load circuits in a multitude of arrangements. Instantaneous reset and no pointer bounce. Two or more used in tandem will provide for continuously-repeating duty cycle. Has a repeat accuracy of 0·25%. Can be easily changed by user to give Reset or Non-Reset on power failure. Range from 15 seconds to 60 hours.

"ATCOTROL 306"
Two timers in one and known as "Duo-Set." Controls two independently set load circuits on a continuously repeating On/Off duty cycle. Adjustable "dwell" period prevents damage to motors from premature field reversal. Range from 30 seconds to four hours. Has a repeat accuracy of 0·33%.

These timing devices now being manufactured by Everett Edgcumbe, by arrangement with Automatic Timing and Controls, Inc., of Pennsylvania, are to the well tried designs which have made them the most used timers in the U.S.A. Used singly, or in combination, most requirements of industrial control can be met and our engineering service exists to meet your special applications. Each device illustrated is of pleasing and matching design and is truly "miniature" in that the front dimensions are only 3¾ inches square.

Write now for copies of catalogue sheets 612B, 613B and 614B

Easy one-hole mounting in standard 3 3/16" cut-out. **Fully insulated ring clamp replaces screws.**

Change cycle any time with handy large knob. **Cover slips off without disconnecting timer from service.** **One piece rolled cover has integral printed wiring schematic.**

DHB 7328

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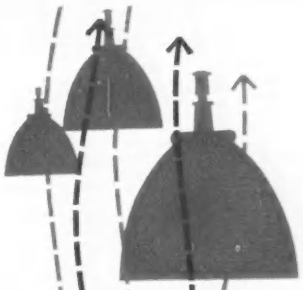

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The Airflo's aluminium reflector is cleaned by a unique high velocity dust expulsion ensuring efficient lighting —a priority consideration in modern industry. Available in two sizes for use with 250W-1000W MBF U lamps. Send for leaflet for details.

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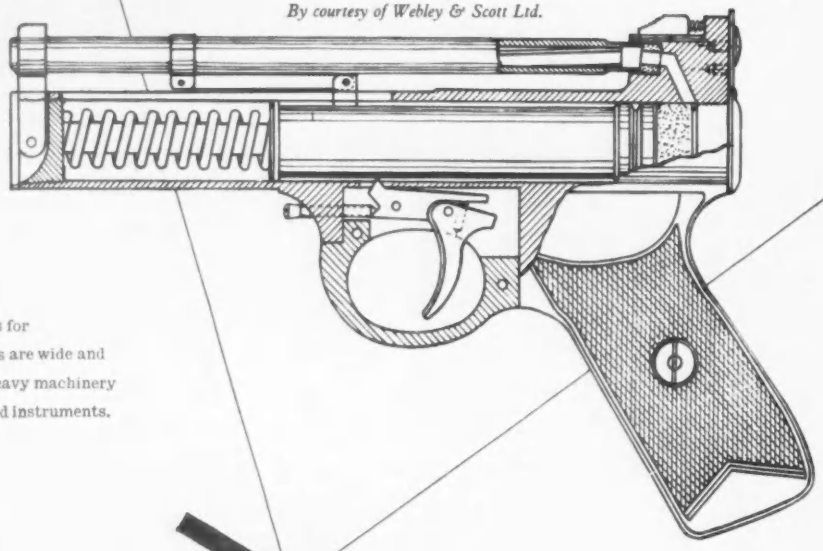

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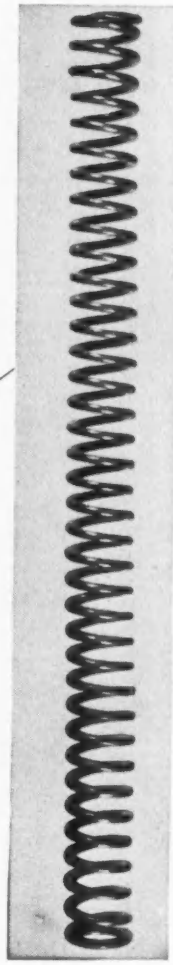

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THURSDAY 1 DECEMBER, 1960
Registered as a Newspaper Volume 138 No. 22

Dans ce numéro

Projet pour Câbles Solides en Aluminium 831

Le développement progressif des câbles d'aluminium multimèches isolés au p.v.c. comprenant des conducteurs aluminium solides de phase, en forme de secteur, ayant une cuirasse concentrique neutre de fils aluminium plats et une couche protectrice de p.v.c. a servi à résoudre plusieurs problèmes de conception, de fabrication et d'installation. Au point de vue conception, la construction préférée comparée aux tentatives antérieures d'emploi de conducteurs solides dans les câbles, offre des avantages de compacité supérieure, un poids plus léger et une quantité inférieure de produit isolateur. Pour la mise en pose directe dans des sols saturés d'eaux corrosives, la protection est assurée par l'application de bandes imprégnées de baryum chromate.

Energie Provenant du Barrage d'Assouan 835

Le but principal du barrage d'Assouan sur le Nil est l'irrigation. Les problèmes qui se posent à cause du besoin qui existe de réduire la chute hydraulique à des intensités inférieures afin de réduire les crues annuelles ont, jusqu'à présent, obstrué la production d'énergie. Le développement des turbines Kaplan et une concession octroyée par les services d'irrigation ont maintenant contribué à la terminaison d'un projet de 350 MW. Neuf groupes électrogènes, dont six opèrent déjà, fournissent l'énergie à la ville d'Assouan au moyen de lignes aériennes de 132 kV, ainsi qu'aux consommateurs d'électricité.

L'influence du Sol sur le Rendement des Câbles ... 838

Plusieurs installations de câbles pourraient avoir leur rendement augmenté si les propriétés locales thermales du sol étaient connues avec plus d'exactitude. Les modifications relativement infimes de la résistivité thermale du sol peuvent résulter en des économies du coût. Les ingénieurs britanniques, au nom de CIGRE, sont à receuillir des renseignements au moyen d'un questionnaire. (Les réponses d'outre-mer seront acceuillies avec plaisir.)

In dieser Nummer

Aluminium-Volleiterkabel-Ausführung 831

Manche Probleme im Zusammenhang mit der Konstruktion, Herstellung und Verlegung von Kabeln sind durch die stetige Entwicklung PVC-isolierter, vieladriger Aluminiumkabel gelöst worden, die Aluminium-Vollader mit sektorförmigem Querschnitt, eine konzentrische, als Nulleiter dienende Armierung aus Aluminium-Flachdrähten und einen PVC-Mantel aufweisen. Vom Konstruktionsstandpunkt bietet die bevorzugte Ausführungsform solcher Kabel, im Gegensatz zu früheren, volladrigen Versuchsmustern, folgende wesentlichen Vorteile: geringen Raumbedarf, leichtes Gewicht und Isolierstoffeinsparung. Bei unmittelbarer Verlegung in mit korrodierender Bodenfeuchtigkeit getränkter Erde, empfielt es sich, das Kabel durch Bewickeln mit bariumchromatimprägniertem Band zu schützen.

Kraftstromerzeugung durch das Assuan-Stauwerk ... 835

Hauptzweck des Assuan-Stauwerks am Nil ist die Bodenbewässerung. Der Umstand aber, wonach zwecks jährlicher Uberschwemmungsregulierung für eine starke Herabsetzung der Stauhöhe Sorge getragen werden musste, bildete bis vor Kurzem ein Hindernis gegen die Nutzung des Stauwerks für die Kraftstromerzeugung. Fortschritte im Kaplanturbinenbau und eine Konzession seitens der staatlichen Wasserbehörde ermöglichten jedoch die Fertigstellung eines auf 350 MW ausgelegten Kraftwerks, das neun Generatorsätze umfasst, von denen sechs bereits im Betrieb stehen. Das neue Kraftwerk wird die Stadt Assuan mit Kraftstrom versorgen und ausserdem über ein 132 KV-Freileitungsnetz Verbraucher in anderen Teilen des Landes beliefern.

Einfluss der Bodenbeschaffenheit auf Kabelnennleistungen 838

Bei vielen Kabelanlagen könnten die zulässigen Beanspruchungswerte hinaufgesetzt werden wenn die örtlichen Thermaleigenschaften des Bodens mit grösserer Genauigkeit bekannt wären. Verhältnismässig geringe Schwankungen des spezifischen Wärmewiderstandes können sich schwerwiegend auf die Kosten der Anlage auswirken. Britische Techniker, im Namen CIGRE, trachten mit Hilfe eines Fragebogens weitere Informationen zu dieser Frage zu gewinnen und hoffen auch Antworten aus Uberseeländern zu erhalten.

ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telegrams: Equivolt . Estrand Telephone: HOLborn 6016

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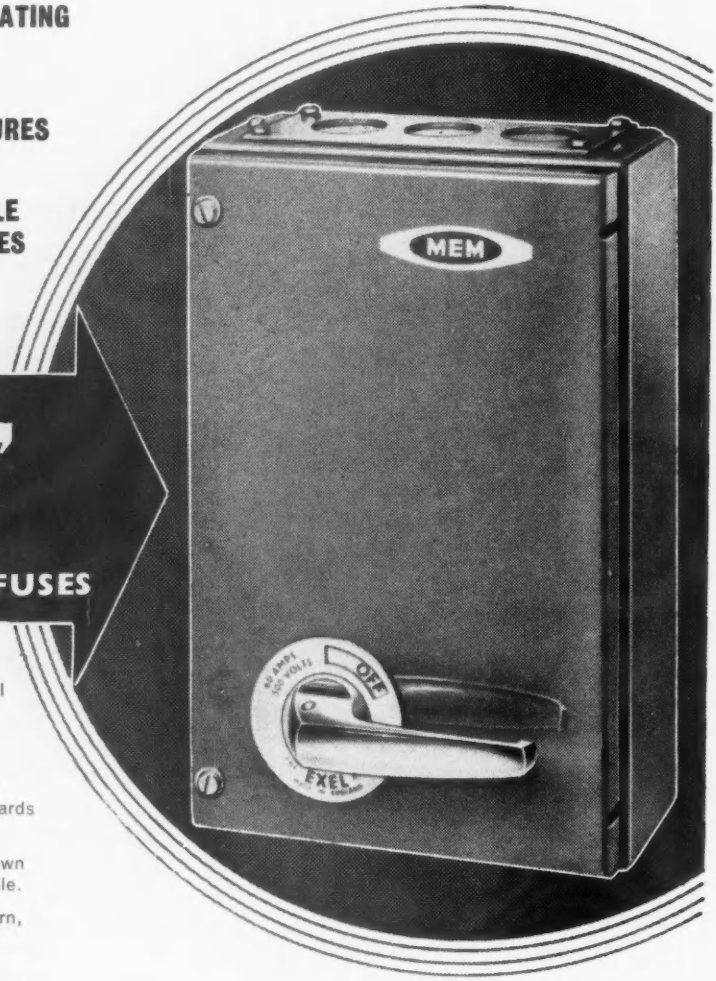

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- M.E.M. H.R.C. cartridge fuse carriers are designed to accommodate H.R.C. cartridge fuse-links to B.S.88:1952, Appendix 'J' Dimensions, Form A—Offset Tags.
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- *"Exel" switches comply with the relevant Temperature Rise, and making and breaking Capacity Tests of B.S.861: Part 1, 1955, and switchfuses with B.S.2510:1954.*

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ELECTRICAL TIMES

ESTABLISHED 1891

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Comment

PATTERN OF TRADE

The announcement by the GEC that they are cutting prices of two types of major appliance received considerable attention in the daily Press, and if this seemed more than warranted it must be attributed to the excellent presentation of the case. Of the two price reductions concerned, that of cookers is one that causes surprise. Cookers are in the van of appliance sales and the latest figures show production running at some 17% above last year. This, then, is not a cut of desperation but one of commercial acumen, the sort of act that is possible only when tooling costs have been written off and one is looking for a larger share of the market. A significant factor is the extension of reductions to the low-priced estate model, which will now sell at £26; it is this cut that is the more likely to stimulate competition from other manufacturers. The reduction in refrigerator prices, on the other hand, is for wholly different reasons. The upward surge in demand last year attracted too many sources of supply; as a result the pipe-line has become blocked with half a million refrigerators which must be disposed of before any sort of balanced trading can be restored. The GEC has not been the first firm to slash refrigerator prices; it will not be the last. Although the potential refrigerator market is as large as ever, it is the one that has shown up in sharpest relief the influence of Government controls in unbalancing trading conditions. In contrast, those appliances that are not influenced by hire-purchase trading are still showing steady stable growth. Fortunately, the electrical industry has not been faced with the severity of the hire-purchase radio or motor markets, nor is it likely to be. It is these that are building up a pressure for revision of hire-purchase restrictions, from which domestic appliances would also benefit. In present economic circumstances it is reasonable to anticipate that the Government may be forced to some amelioration of present restrictions early in the new year.

LARGEST NUCLEAR YET

With a net electrical rating of 580 MW based on two reactors, the Sizewell nuclear power station is the largest ordered in the British series. This seventh station is also notable for the remarkable advance in size secured in the turbo-alternators, which are to be of 325 MW capacity despite the relatively modest h.p. steam conditions adopted, 646 lb/sq in., 700°F. Clearly, important design advances have been secured, of which the preliminary details give only an indication through a mention of "the longest exhaust blades yet manufactured," and of use of bled steam to keep down moisture content at the l.p. end. In respect of steam conditions

and in some other characteristics, Sizewell, in comparison with its predecessor, Dungeness, in the second round of CEGB nuclear station contracts, illustrates the wide choice facing designers in securing the best solution in terms of effective cost per kWh over full station life. Despite its advanced features, it seems that Sizewell will have an output capacity 2% lower than Dungeness in terms of MW output per ton of uranium invested, and because of the more modest steam conditions will produce about 7% less electrical energy for every pound of uranium burnt up. Yet the manufacturers are confidently claiming that they will generate electricity "cheapest in the world so far from a nuclear power station." The £55 million value placed on the Sizewell contract suggests a capital cost, excluding fuel, of £95/kW. The implied saving on earlier designs must come from economy in details, in the cost of individual plant items and in construction techniques. In this respect, a notable feature will be the combination of the two reactors in a single building, thus changing at last the essential outline of the British nuclear station design as set by Calder Hall and retained in all succeeding stations.

MAKING THE MOST OF CABLES

It is a fundamental in the design of a cable installation that the rating allocated to a particular cable depends on the ambient conditions. When a directly embedded cable is concerned, rating depends on the thermal effectiveness of the soil. The more heat the soil can conduct away for a given cable surface temperature, the higher the permissible current loading of the cable. This problem of the mains engineer's "g" is made complicated because soil is a chancy thing, varying widely in its thermal resistivity without any easily predictable pattern. The industry has, on the whole, taken the easy way out in the past and adopted a value of "g" that is unlikely to lead to cable overheating. But this involves a factor of safety that may be highly expensive where cables for transmission voltages are concerned, and there has been growing attention to measuring "g" along the cable route, so that a realistic rating may be given. Measuring so variable a quantity, however, may be a lengthy process and it is inevitably still somewhat indefinite in the end result of cable rating. The industry is currently attempting to find some means of judging soils in a way that will permit a more realistic value of "g" to be assigned, without the need for anything more complex than classification of soils on a basis of sight and touch, and subsequent consultation of prepared tables. To evolve such a technique is clearly a matter for co-operative work, and it is along these lines that the task is being tackled. This week we include a questionnaire aimed at surveying existing practice more widely. The engineers directing the co-operative effort will be greatly helped by replies from as wide a field as possible. Replies will be used to produce data of value to all cable users, so there is incentive for all to help themselves by completing the form.

WIRING FOR OFFICES

An article this week tells of a solution developed in New Zealand to the problem of wiring offices where movable partitions are used. It brings a reminder of how universal is the problem of adapting electrical installation techniques to fit in with fast-developing building practice. Coping with rooms that change their size and shape is now a familiar problem, although there is no universal acceptance of any one method of dealing with it; but there are other difficulties that arise less commonly, and often with insufficient warning to give the electrical engineer a chance of determining a fully satisfactory answer, such as use of structural techniques which do not permit the usual making of holes to accommodate electrical fixings. On the electrical side, there are the special demands of floor-warming systems, which can greatly complicate the use of floor ducting systems for power and telephone distribution. When these difficulties arise, something becomes obvious that is usually submerged: that there is too little contact in early planning between architect, constructional engineer and electrical installation planner.

SOLID CABLES

To many engineers the idea of a cable with solid conductors seems improbable at first consideration. In the development of solid-sector aluminium cables, this has none the less been achieved without limitations of flexibility that might be expected. A series of articles that begins in our pages this week outlines the present status of design, manufacturing and installation technique of this type of cable, which received its first notice in our pages 18 months ago. Once the limitation to circuits where a concentric neutral without external earthed sheath is accepted, a number of advantages appear. One of the more striking is the economy in dielectric achieved in the design directly through use of solid conductors instead of stranded cores. Another follows almost incidentally from the method of construction adopted; it is a highly promising performance under through short-circuit currents. This characteristic is gaining in importance in cable evaluation, through the need to give full scope to economic switchgear possibilities. Finally, the design adopted is notable for the attention that has been given to making it a practical manufacturing possibility in terms of existing cable-making machinery. The designers' claims are high here, and appear to have good support. If users come to like the cable—and its relative ease of jointing may recommend it to them, quite apart from price considerations—then it is probable that their accustomed suppliers will be able to make the cable with relatively little difficulty.

Meteor

This week's quick summary of electrical news faces advertisement page 16

Solid aluminium cables

PART 1. DESIGN CONSIDERATIONS

A LITTLE over 18 months ago—on 4 June, 1959, to be exact—these pages disclosed the first information to be released on a new development in distribution cable technology, solid-core, plastic-insulated, aluminium cable, later to be known as "Solidal." At the time it was made clear that the new construction was only just out of the development stage and, indeed, the related jointing techniques were still being investigated. Since then a number of British and European cable companies have taken up manufacture of "Solidal" cables and several installations have been laid down. The transition from development to production has taken place and much valuable information on processing has been acquired. The cables in service, some of which have now been carrying current for a twelvemonth, are behaving satisfactorily, though it is as yet too early to draw conclusions as to their eventual life. Jointing techniques have been perfected, applied and found to be satisfactory and practicable. As a means of bringing experience to date before other makers and users of "Solidal" cables, Alcan S.A. of Zürich are shortly releasing a handbook* on the subject which will first appear in English and later in other European languages. It will cover basic design, manufacturing techniques and installation practices from the earliest days, when the preliminary investigations were undertaken on a line suggested by Mr S. F. Rice, Electrical Sales Manager of Alcan S.A.

Arrangements have been made for extracts from the book to be made available for readers of the ELECTRICAL TIMES and three have been prepared. This, the first, deals with basic design considerations. Manufacturing and installation techniques are to be dealt with individually in the remaining extracts, which will appear at a later date.

Early Work

One of the first steps taken was to examine possible markets for such a cable. Extensive surveys soon established that by far the largest tonnage of conductor material was absorbed by low voltage cables such as are used for urban distribution and factory installations. It was, therefore, decided to concentrate initial efforts in research and development towards this particular field.

The main requirements which would have to be satisfied are as follows:

1. A current-carrying range of 100 A to 400 A.

2. Voltage between phases up to 1·1 kV. It was felt that the costs of insulation would not materially be reduced in cables for working voltages below that level and both manufacturers and users would profit by standardisation in voltage ratings.

3. A single class of cable equally suitable for direct burial, insertion in ducts, indoor mounting or overhead catenary suspension; that is, one design of cable for all types of service.

Fig. 1. To test the resistance of "Solidal" cables to corrosive soils when the outer sheath was abraded or damaged an extensive programme of experiments was carried out. Here a group of cables are being prepared for such a period-test with current passing through them

4. Simultaneous compliance, as far as applicable, with international standards and, in particular, the following:

Britain:	Draft revision of BS 2004 and BS 2746
France:	NF C 32-202 (1956) and NF C 32-200 (1954)
Germany:	VDE 0271/5·58
Netherlands:	KEMA Nr. K-30 (1959)
Switzerland:	SEV 1004 (1959)
Italy:	CEI 20-4 (1953)
International:	CEE Nr. 13 (1955)

5. Low production cost. Special equipment or complex processes to be avoided. Production to be kept, as far as possible, within the capacity of any manufacturer of bare overhead aluminium conductors with equipment for plastic extrusion.

6. Simple jointing methods suitable for live working.

7. Inherently safe in use, including risk from mechanical damage when on load.

8. General standards of quality and reliability equal to or above that for other cables on the market for comparable duty.

The result of the study within these parameters led to the adoption of a basic design comprising three cores of solid aluminium, sector-shaped, insulated with p.v.c. and laid up together, the whole being wrapped with transparent p.v.c. tapes to form the bedding of the fourth conductor, a neutral comprising a concentric layer of flat armour

* *The Solidal Cable.* Alcan S.A., Zürich.

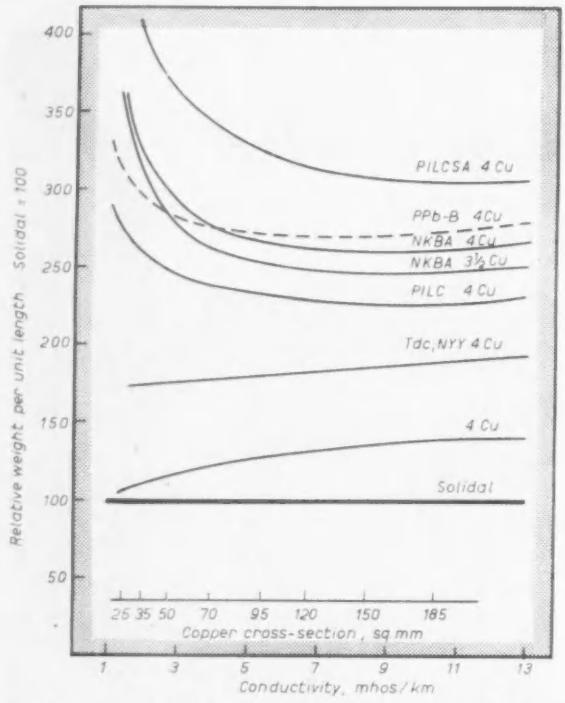


Fig. 2. Comparison of weight of conventional-type cables with "Solidal." "Solidal" = 100. The line, 4 Cu, represents the weight of four bare copper conductors

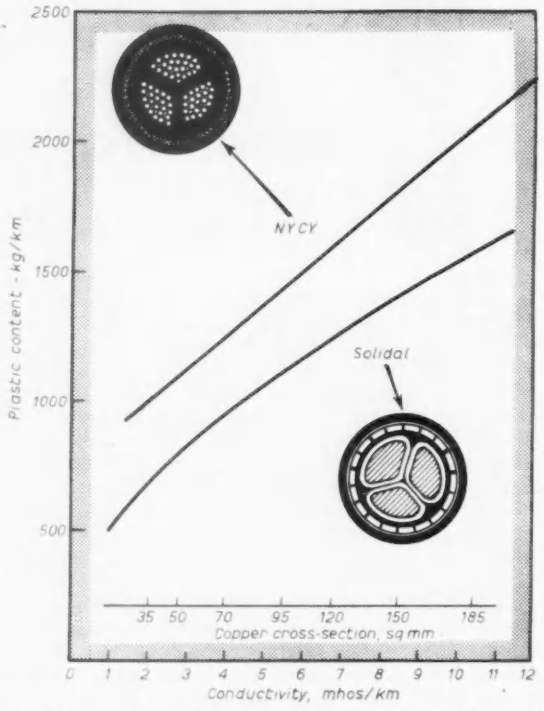


Fig. 3. The relative weights of p.v.c. required in the manufacture of "Solidal" cable and stranded copper cable of equal conductivity and similar configuration

wires. The outer oversheath of the completed cable to be of extruded p.v.c.

In comparison with conventional stranded conductor cables, "Solidal" cables to this design are strikingly light and compact. Fig. 2 gives a comparison of its weight with that of equivalent size conventional cables. The same cable is suitable for both three-phase/neutral distribution and for three-phase balanced load systems. In the latter, the concentric conductor acts as a protective armour and earth continuity path.

This basic design, distilled from every conceivable configuration and combination of materials, is to some extent a compromise but one which is believed to be not far below the optimum. Modifications could be made in a number of directions but only at the expense of other properties.

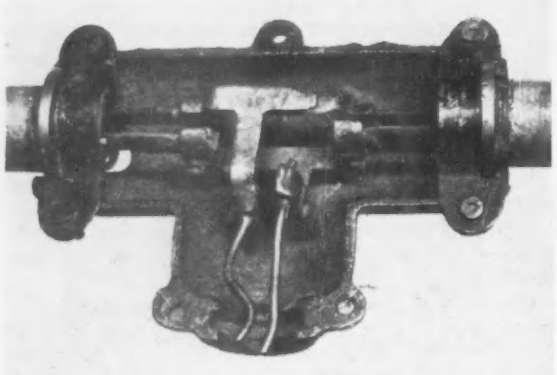


Fig. 4. A solid sector "Edison Tube" installed in Milan in 1882 (Edison-Volta, Milan)

Not all cable-makers are equipped to produce tubular aluminium sheaths. Therefore, to comply with the condition that the design should avoid fabrication processes for which abundant facilities did not exist, the balance of favour fell towards the choice of plastic insulation without an external tubular metal sheath.

The armour wires, of flat cross-section, were designed for ease in drawing to shape and size in the type of wire drawing machine with which many aluminium fabricators are equipped, the number of wires being adjusted so that they could be applied in an ordinary overhead cable stranding machine using the 18-bobbin cage only.

Configuration

Initial development and design work was confined to the 3-core, concentric neutral cable. Investigation among distribution engineers in many parts of the world indicated that, where protective multiple earthing was not already officially in use, it existed *de facto* or its introduction was being studied. It appeared that a concentric neutral/armour conductor would be sufficiently acceptable for general use by the time development had reached completion. Viewed in retrospect, this seems to be substantially true.

There are, of course, many other configurations which may be adopted. Single, twin and 4-core cables have been designed, having either steel or aluminium armour. A particularly interesting arrangement is one which has since been developed by Unidare Ltd. of Dublin for industrial wiring. This comprises one neutral and three phase conductors in a modified sector form with a fifth, earth conductor at the geometrical centre, an elegant solution in terms of economising in the use of p.v.c. insulation (Fig. 6).

A number of different series of cable sizes exists throughout the world. These include British sizes expressed in cross-sectional area, American sizes in

circular mils and equivalent a.w.g. and many metric systems based on varied nominal sectional areas. There are few common sizes.

Range of Sizes

For each cable size in copper there are two possible equivalents; one based on resistance—or voltage drop—and the other on current-carrying capacity for a given temperature rise above ambient. Which basis to choose? Neither is demonstrably more rational than the other or more likely to be acceptable generally. In the engineering sense the best solution is one which provides a limited number of sizes in well-regulated steps and the decision was made to base this in steps of nominal current rating under the most common ambient conditions. On this basis a number of cables was made up and tested in a suitable range of sizes.

The chosen ratings do not, of course, preclude the production of "Solidal" cables in any size to meet national standards or individual customer's requirements. In the UK it has been decided to design the cables on the basis of resistances and sectional areas specified in BS 2791: 1956. The multiplication of sizes without economic justification is, however, hardly in common interest; standardisation is to the best interest of both buyer and cable-maker.

The Solid Conductor

There is nothing new in the use of solid sector cable conductors. The first insulated cables ever to be made seem to have had solid copper conductors. Fig. 4 shows one of the earliest examples installed in Milan by Edison-Volta in 1882 and history records similar cables being installed in London a year earlier.

During the second world war, paper-insulated cables with solid sector aluminium conductors were made on a limited scale when copper was in short supply, but were abandoned due, it is believed, to difficulties with the paper insulation. In recent years, small sizes of street lighting cable closely resembling "Solidal" have been in use in Berlin (West) and when the first announcements appeared in these pages it was revealed that British Insulated Callender's Cables had produced four-core plastic-insulated cables with solid aluminium cores experimentally a few months earlier (Fig. 5).

An aluminium conductor is larger in net area than the equivalent copper conductor and the first problem was to reduce the overall dimensions of the aluminium-cored cable as far as possible. With aluminium a solid conductor helps. It can be made of pure annealed metal with a conductivity of over 62% I.A.C.S. as compared with 61% for drawn wires. The best commercial compacted wire conductor is rarely as much as 95% solid, so there is a space advantage to be gained by the use of a solid conductor.

Fully annealed aluminium has an ultimate tensile strength of only 7 kg/sq mm. (4·5 tons/sq in.) as compared with 25 kg/sq mm. for annealed copper; the modulus of elasticity is about 50% of that of copper. Solid aluminium conductors will yield at a load of less than one-third of that required for an equivalent annealed copper conductor.

The shape of solid sector conductors can be closely controlled; a shaped stranded conductor cannot to the same extent. The conductors of "Solidal" cables can,

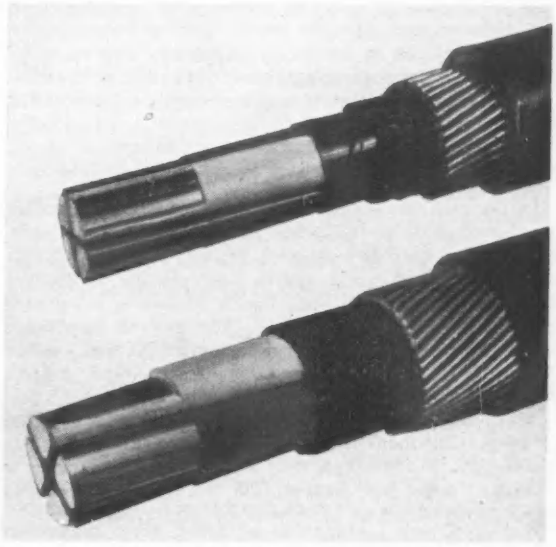


Fig. 5. Experimental 4-core, solid sector, aluminium cables with p.v.c. insulation and steel wire armour (BICC Ltd.)

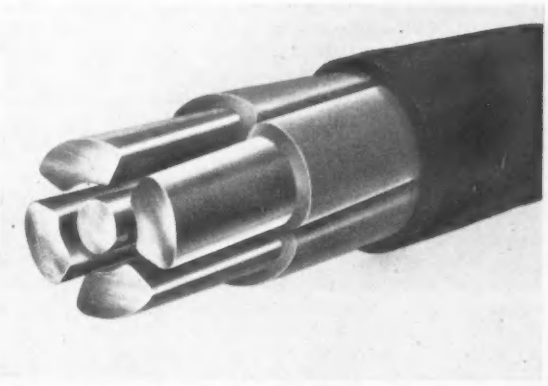


Fig. 6. A solid multicore aluminium cable design with central neutral for industrial wiring (Unidare Ltd.)

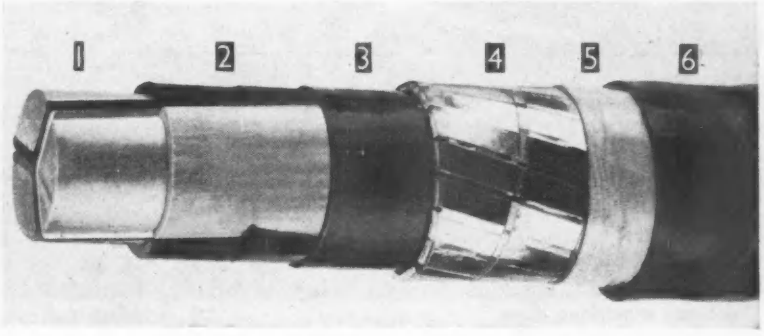


Fig. 7. A cable end of "Solidal" stripped back to show construction

1. *The three shaped aluminium solid sector conductors.*
2. *P.V.C. conductor insulation coloured for phase identification.*
3. *"Melinex" tape and p.v.c. bedding for the neutral conductor.*
4. *The concentric neutral conductor comprising flat aluminium wires, spiral wound. These also serve as armouring. A current equalising aluminium tape is also applied around the conductor.*
5. *Barium chromate impregnated tape for corrosion inhibition.*
6. *The oversheath of p.v.c. compound.*

therefore, be nested very closely, saving fillers and keeping both size and plastic content to a minimum. This is, perhaps, the most important advantage of the solid conductor in sector form, enabling a high space factor to be achieved in the cable.

The smooth surfaces of the solid conductor, by preventing the insulation from adhering, promote flexibility in handling. The insulation is subjected to pressure but never to shear, a factor which favours the use of harder grades of p.v.c. since it compensates for their lower elongation.

Solid conductors can be made more cheaply than stranded ones and there are several methods for their production. They can be formed by rolling and drawing or by extrusion, and pre-spiralling before insulating is unnecessary. A solid conductor is easy to joint, particularly for service connections.

Insulation

In the past, paper has been the predominant insulant for the types of power cables that "Solidal" can replace. Although cheaper as a material than its rivals, it requires a moisture-proof metal sheath and jointing techniques demand relatively high skill. Plastic insulation is superior in these two respects and is rapidly gaining acceptance as an insulation for cables of this type. P.V.C. was selected for all initial tests, though other plastics—and, indeed, paper—are being tried.

With plastic, thickness of insulation is more a question of mechanical than electrical import. No real attempt has been made to assess how thin the insulation can be on a "Solidal" cable but, instead, the thicknesses in various national specifications have been adopted instead.

Bedding

The correct construction of the bedding over the laid-up cores is important since it serves several functions. From discussions with cable-makers and users it was elicited that short-circuit currents of the order of 100 times normal full-load current over a period of up to 10 cycles may be expected. In conventional paper-insulated cables the bedding and sheath acts as a container for the very large mechanical forces set up between conductors under heavy current fault conditions.

In "Solidal" cables, the insulated conductors lay up naturally to form a solid mass and the bursting force on the aluminium section is borne by large areas of insulation in compression against a tightly applied "Melinex" tape. This is followed by p.v.c. tapes, also tightly applied, and this adds to the resistance against disruptive mechanical forces on short-circuit in addition to providing a firm basis for the flat neutral/armour wires. Clear or translucent tapes are specified to enable identifying core colours to be recognised before the sheath is removed, a valuable feature in distribution cables on which service connections have to be made.

Neutral Armouring

Flat wires are used to make hard bedding possible, reduce the bulk of the cable and also the number and cost of the wires. Round wires would have had to be smaller, require softer bedding and, in addition, would have necessitated special armouring machines. From the costing point, a small number of large wires is cheaper to apply than a large number of small wires added to which is the fact that the aluminium wire industry is already equipped to produce large-size wires in quantity for bare overhead cables. There is not, at present, the same demand for fine aluminium armouring wires.

The choice of a neutral cross-section equivalent to that of a core conductor was governed by the consideration that many distribution authorities use a full section core for the neutral and, in any case, reducing the neutral section by 50% would affect the cost of the cable by no more than 5%.

In the interests of rationalisation, the same size of wire was adopted for 150 A and 200 A cables and a second size for 250 A and 300 A cables. This meant an increase in neutral area over core area in two sizes of cable, but it simplifies manufacture and reduces the range of associated fittings. The lay length of the armouring is limited to ensure flexibility and to increase circumferential strength.

Current Equalising Tape

Where a concentric stranded conductor is used as a neutral or earthed armouring it is important that, in the event of a fault, the resistance of the earth path should be a minimum. The whole of the conductor must be effective with each strand carrying an equal share of the current. In "Solidal" cable the individual strands are connected laterally to each other by a spiral aluminium tape wound over the neutral conductor.

Barium Chromate Tape

Another aspect of design which has been given careful consideration is the effect of burying the cable in grounds saturated with corrosive soil waters (Fig. 1). In the ordinary way, full protection is given by the p.v.c. oversheath, which is not attacked by, and is impervious to, such contaminants, but there is always the latent possibility that the oversheath may become perforated or scuffed by mechanical damage, allowing the fluids to enter. A secondary defence barrier was, therefore, provided in the form of a textile tape impregnated with a class of chemical known as "corrosion inhibitors." Of the many available, the chromates of certain metals are most generally useful for aluminium and, of these, barium and zinc chromate have the additional feature of "leaching out" only very slowly over extended periods. Further experiment, reinforced by experience with transatlantic telephone cable incorporating aluminium strip screen under a polythene outer sheath, turned the balance of favour towards barium chromate and this has been adopted as the impregnant for the barrier tape when specified for direct burial in water-bearing soils.

Outer Sheath

An outer black p.v.c. sheath, applied over the neutral conductor and/or chromate tape, of thickness to meet the most severe specifications in regular use, completes the cable. The choice of black for the oversheath is influenced by the consideration that the cable may be used as an overhead line, where it will be subject to prolonged exposure to sunlight. Experience has shown that black p.v.c. of the proper compounding exhibits the best resistance to such conditions.

As a final point, clear and permanent marking of the cable and cores is prescribed in the specification. It is important that the workman who is preparing to joint a length of "Solidal" cable shall be aware that the first layer of armour may be carrying current. The oversheath must, therefore, bear the words "neutral concentric," while the colour of the inner conductor insulation provides ready identification of the respective phases.

In the next article we shall deal with the problem of installing and jointing "Solidal" cables.

Power from the Aswan dam

350 MW PROJECT DESCRIBED AT JOINT I.E.E./I.C.E. MEETING

THE Aswan Dam lies across the River Nile some 600 miles from the delta. Built in 1902, to the design of Sir Benjamin Baker, to store water from the flood period against the dry season for irrigation purposes, it has been heightened on two occasions. The original dam, 75 ft high, provided a storage capacity of 1,000 million cubic metres (1 mld cu m). In 1910-11, the crest was raised to 98 ft, increasing storage by a further 1·5 mld cu m, and again in 1933-34 to 125 ft to provide a final storage capacity of 5·6 mld cu m. The present level, however, allows for storage of only 5 mld cu m, which compares with a total annual flow through the river system of around 83 mld cu m.

The available head and storage capacity of the system automatically invited consideration of hydro-electric power generation as a subsidiary function. Although this was discussed as early as 1932, there were certain aspects which complicated the issue. During the period from May to mid-July each year the reservoir water level is lowered progressively by raising the discharge rates so as to be ready to accept the flood waters from the upper reaches, usually arriving at the dam area in late July. At the lowest point the effective head is only 10 ft. This annual variation of head, ranging from 108 ft down to 10 ft, makes efficient turbine design and operation virtually impossible. (Seasonal lowering of the reservoir level is responsible for the fall in effective head, not rising levels below the dam as presumed on page 794 of last week's issue.)

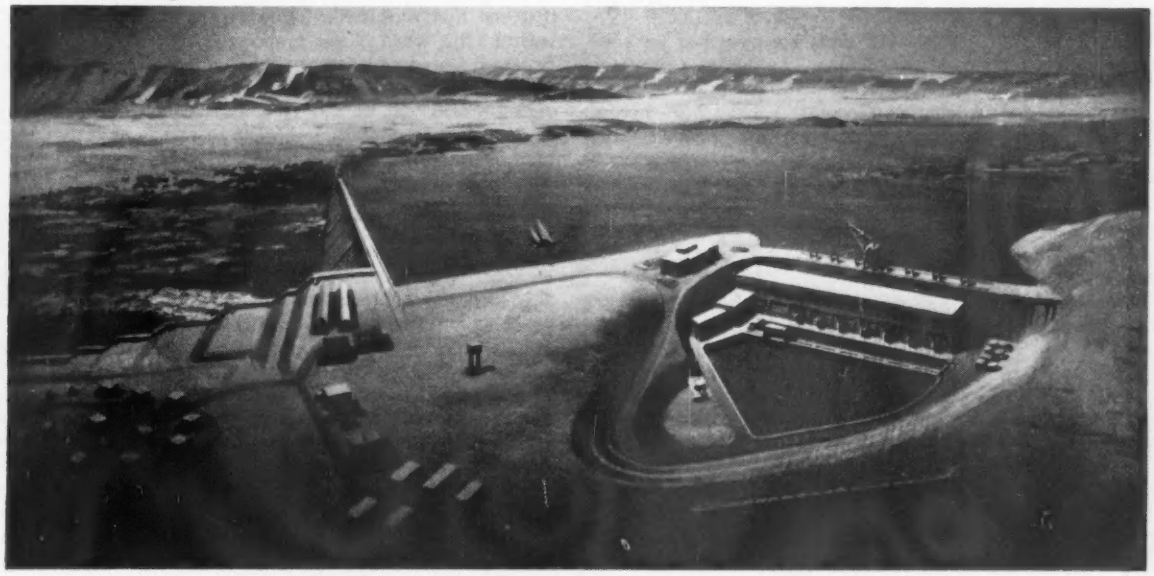
In 1945, the Egyptian Government set up a Hydro-Electric Power Commission, under the Presidency of Dr Abdel Aziz Ahmed, which examined all the proposals and finally authorised the construction of the 350 MW station and headworks, which were commissioned early this year. Consultants to the scheme were Kennedy and Donkin, of London, and Vattenbyggnadsbyran, of Stockholm. Mr G. F. Kennedy and Mr V. Furuskog, partners of these two firms, described the project* before a joint meeting of the ICE and the IEE in London last week.

The Civil Work

The civil engineering works comprised a head-race, intake dam, surge basin, four tunnels conveying the water downstream of the dam and a tail-race, together with the power-house, turbine foundations, transformer and switch-gear platforms, etc. These were constructed to the west on the bank adjacent to the dam, the tunnels and tail-race extending some 2,500 yd downstream past Soheil lock. The four tunnels from the basin actually pass under the navigation canal below the lock before discharging into the lower Nile reaches.

The intake dam, nearly 1,000 ft long at the crest and 118 ft high at the main part, is of granite rubble masonry with a watertight concrete front and is founded on granite. A concrete apron, extending 18 ft upstream, gives access to the turbine intakes, each of which is provided with screens, bulkhead gates and intake gates. A 150-ton crane on the dam serves the intake gates and roller carriages.

* Paper 6463: "The Aswan Hydro-Electric Scheme," Institution of Civil Engineers.



View of the model showing the power station with, in the background, the Aswan dam

Behind the dam lies the turbine-house, a concrete structure containing eight 77 ft long bays, each housing one main unit or two house units. Sloping penstocks couple the turbine casings to the intake openings, the steel spiral casings being embedded in concrete. Draft tubes on the main units are 65 ft wide and extend 65 ft downstream before discharging into the open surge basin. Four D-shaped tunnels, each of which is 1,600 sq ft cross-section and range from 2,450 ft to 2,960 ft in length, convey tail water from the basin to the downstream tail-race.

The turbine-house is of reinforced concrete, based on a system of vertical columns, panel walls and crane beams, with a steel lattice roof and thermal insulation covering. The area is divided into nine bays, each housing one main set or two house sets and each bay, with its superstructure, is a self-contained unit having no rigid connection with adjacent bays. A shelf on the downstream side provides accommodation for the main transformers and is connected to the downstream open structure supporting the draft tube gates and raising gear by a transporter bridge. Administrative offices and control rooms are adjacent to the power-house, with the outdoor 132 kV switching station on a platform on the opposite side of the surge basin.

Turbines

Contracts for the turbines were divided between Swiss and Swedish firms. The turbines are all of the Kaplan type, the main units being designed to develop an output of 65,000 h.p. at 88 ft to 100 ft head, falling to 6,500 h.p. at 20 ft. The irrigation authorities agreed, in 1945, to raise the minimum flood season level to 26 ft and this, together with an extra head achieved by excavations at Soheil lock downstream of the tunnel outlets, gives a minimum effective head of about 32 ft. At this head, machines 3 and 4 develop 17,400 h.p. and the remainder 19,500 h.p. Turbines for the house units are rated at 17,150 h.p. at 110 ft, falling to 3,210 h.p. at 32 ft. The speed of the main sets is 100 r.p.m. and that of the house sets, 250 r.p.m.

Generators

The main generators are of conventional salient pole design with tangentially mounted air ducts for closed-circuit cooling. They are rated at 49,500 kVA, 0·95 p.f., 11 kV, 50 c/s. The house sets are rated at 13,550 kVA, 0·85 p.f., 11 kV, 50 c/s. All units are equipped with air-operated braking pads and hand jacking pumps. Generators 1 to 7, of Swiss manufacture, have two guide bearings and an overhead thrust bearing. Generators 8 and 9, of Swedish design, incorporate combined thrust and guide bearings below the rotor, though not in umbrella type of construction.

Electrical Engineering Contractors

Turbines—1, 2 ...	Charmilles (Geneva), Switzerland.
3, 4 ...	Escher Wyss (Zurich), Switzerland.
5-9 ...	KMW (Karlstad), Germany.
Alternators—1, 2 ...	Secheron (Geneva), Switzerland.
3, 4 ...	Oerlikon (Zurich), Switzerland.
5-7 ...	Brown Boveri (Baden), Switzerland.
8, 9 ...	ASEA (Vasteras), Sweden.
Transformers ...	ASEA (Vasteras), Sweden.
132 kV Switchgear ...	ASEA (Vasteras), Sweden.
11, 3·3 kV and 400 V Switchgear	Reyrolle (Hebburn), England.
Overhead lines ...	Societa Anonima Elettrificazione (Milan), Italy.
Cranes—Station ...	Societe des Forges et Ateliers du Creusot, France.
Erection ...	Ansaldo (Genoa), Italy.
Lock ...	Shehada Engineering (Cairo), Egypt.
Intake ...	Waagner-Biro AG (Vienna), Austria.

Consultants:
Kennedy & Donkin, London, England.
Vattenbyggnadsbyran (VBB), Stockholm, Sweden.

Transformers

Each of the main units is solidly connected to the primarily windings of 51 MVA, 11/132 kV transformers by short, bare copper connections. The 132 kV windings are, in turn, connected by overhead cable to the 132 kV switching station. In addition, sets No. 3 and No. 6 are connected through switches to the 11 kV house busbars in parallel with the output of the 11,500 MW house sets. Two 3 MVA 11/3·3 kV transformers couple the 11 kV and 3·3 kV busbars where they link with the diesel station, and the 400 V supplies for auxiliaries are provided from busbars coupled to the 3·3 kV bus through four 400 kVA transformers and, for station services, through two 800 kVA transformers.

Outgoing supplies to Aswan town are provided from the 11 kV bus and to the fertiliser factory, the pumping station at Sudd-el-Ali and the High Dam site at Edfu and Komobo by 132 kV overhead lines.

Fire protection is provided by a water emulsification plant for the transformers and by CO_2 for the generators.

Commissioning

Orders for the generators and turbines were placed in 1947 and the civil engineering contracts were signed in May, 1953, the site of the station having been altered in the meantime. The dam was completed in 1958 and the first of the main units commissioned at the official opening in December, 1959. Today, the house sets and six of the main units are in service and the remainder are in an advanced state of erection.

After reading a summary of the papers, in which Mr Kennedy paid tribute to the co-operation between the 37 countries and seven nationalities engaged on the project with English as the common language, the authors presented an excellent sound and colour film of the project from the earliest stages to the official opening.

Discussion

In the subsequent discussion, Mr MacDonald, son of Sir Murdoch MacDonald, whose name is linked with the two stages of development of the Aswan Dam and much of the earlier history of hydro-electric survey, mentioned that the first time hydro-electric generation was mooted was in 1902, when it was proposed for an electric railway between Aswan and Luxor. The first fertiliser project was raised in 1910 after a visit to Norway. Mr Herbert Addison said that he was glad Mr Kennedy had referred to the happy co-operation between the many nationals and, indeed, this international spirit between engineers was something of which all could be proud.

Mr James Walker commented on the design of the main generators. The large capacity of the station cranes was presumably for lifting out the whole rotor for maintenance. Recent designs of generators, larger in capacity than Aswan, with the rotor and stator split in sections enables cranes of only 75 tons to be used. The high short-circuit ratio also seemed excessive and must have added to the cost. D.C. exciters, too, might be giving place to the a.c. exciter with semiconductor rectifiers in future. He also commented on the effects of dust from braking pads and suggested that dynamic braking would solve the problem. As a final point, he proposed the use of fire-inhibiting insulation for stator windings. The vapours emitted at high temperatures were as efficient as CO_2 in extinguishing fires, with less risk of inadvertent operation. Mr O'Sullivan spoke on siltation problems and the authors briefly replied.

Readers Views

Correspondents writing under pseudonyms are asked to submit their names and addresses in confidence to the Editor

Lighting in Iron and Steel Works

YOU recently printed an article called Lighting in Iron and Steel Works based on a paper which I presented to the Iron and Steel Institute. As I had not the opportunity of commenting on this before publication, I should be pleased if you would make it clear to your readers that all the opinions expressed in this article are not mine. I would refer especially to the section titled "Lighting intensity."

I do not agree—nor I am sure do many manufacturers of enclosed industrial fittings—that dust deposition on the upper surfaces of lamps is "inescapable." Nor do I agree that one can generalise and say that it is uneconomical to wait for lamps to burn out before replacing. There are so many aspects to consider which affect lamp replacement policy and not the least of these is the fact that it is only very infrequently in an iron and steel works that a lamp burning out will interfere with production.

Further, I do not believe that good lighting pays "high dividends" if by high dividends is meant increased profit —at least not in the iron and steel industry. Lighting is an amenity and a service and as such it need only be the best justifiable.

Finally, I had hoped that one of the themes of my paper was that whilst it is comparatively easy for lighting experts to evolve maintenance schedules and record systems which would ensure that lighting is kept at optimum performance (and I agree that these things are desirable), in these days of labour shortages, increased production, expanding plants, new techniques, etc., it is not quite so easy for the plant electrical engineer to operate these systems. After all, his real job is to make steel—or what is often forgotten, profit.

D. R. M. Nisbet, A.M.I.E.E.,
CHIEF ELECTRICAL ENGINEER,
APPLEBY-FRODINGHAM STEEL CO.,
SCUNTHORPE, LINCS.

Isolators and Switches

MR OXLEY (ELECTRICAL TIMES, 20 October) has illustrated the confusion that exists between isolators and switches. The distinction is referred to in the foreword of BS 3078:1959 as follows:

> Particular attention is drawn to the distinction now made between an "isolator" and a "switch." An isolator has no rated making or breaking capacity and if the position of the device in the system necessitates a making or breaking capacity for safe operation, a switch or circuit-breaker should be used.

A switch, on the other hand, should be capable of making and breaking load current and for some categories, making on to a fault.

Where oil-immersed switchgear is concerned the three devices, i.e., the isolator, oil switch and oil circuit-breaker, are covered by British Standards 3078, 2631 and 116 (or 936), respectively. For air-break switchgear the coverage by British Standards is not complete, but the distinction between the air-break isolator, air-break switch and the air-break circuit-breaker should be maintained.

The use of the term "isolating switch" is peculiar to the motor control gear industry and its use is to be deprecated elsewhere. It may be presumed that an "isolator" fitted with a load breaking device is capable also of making load current and hence it should be classed as a switch.

C. D. Woodward,
PRESS AND PUBLIC RELATIONS OFFICER,
BRITISH STANDARDS INSTITUTION,
LONDON W.1.

Heating Oil

IN your issue of 10 November, F. J. Halligley, writing about expanding ball and roller bearings by heating them in an oil bath, states: "I was horrified to observe a drum of light machine oil being heated by a blow lamp," and then describes "contriving an electrically and thermostatically controlled oil tank, the heating element being of the type intended for domestic hot *water* tanks."

I, too, am horrified at the use of a heater designed for water heating being used for oil heating, unless it is not loaded at the normal maximum water heating rating, for oil heater loading is generally at least 50% of that for water heating to prevent carbonisation, whilst many oils when heated become corrosive and attack the element sheathing.

A.M.I.E.E.,
YORKSHIRE.

Earthing and Safety

MEGOHM is right when he says (ELECTRICAL TIMES, 3 November) that "many arguments and discussions could be based on the pros and cons of the earthed and non-earthed systems." Unfortunately this must always remain a matter of opinion, incapable of statistical determination, because, whilst we can amass statistics of the number of instances where broken earth connections have been responsible for fatalities, we shall never know the number of lives which have been saved because the metal cases of apparatus have *not* been earthed in the "earth-free" situation which, according to the thirteenth edition of the IEE Regulations, no longer exists.

E. H. Jesty, A.M.I.E.E.,
BROMLEY, KENT.

[Since we received this letter, we have learned with sorrow that Mr Jesty has died.—ED.]

13 Amp Plugs

YOUR contributor *Megohm* has once again performed a service in raising the intractable problem of matching the correct size fuse contained in 13 A plugs to the load of the appliance. The use of appropriate information on the fuse dispenser card by a certain manufacturer is all to the good. Other makers are also to be commended on their efforts, such as warning tags.

Since so many interested bodies are working towards a solution, perhaps the British Standards Institution, who are after all responsible for BS 1362, covering 13 A plugs, could also play a part. I would suggest a revision of BS 1362 which will ensure that the base of the plug contains the words in bold indelible red lettering: *Important for Safety Insert the Correct Size Fuse.*

M. Neidle, GRADUATE I.E.E.,
EDGWARE.

Cable ratings depend on soil thermal resistivity

SCOPE FOR SAVINGS ON INSTALLATIONS

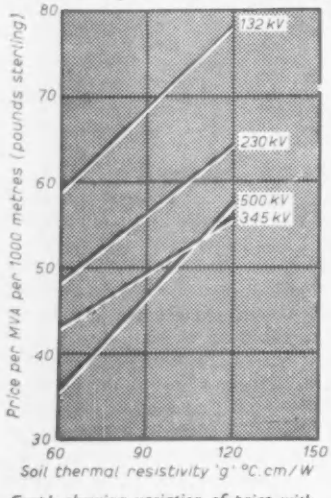
RECOGNITION of the significant influence of soil thermal resistivity upon the size of cable needed to meet known loading requirements, and, therefore, upon the cost of cable installations, has emphasised the importance of developing better methods of assessment of soil thermal resistivity. This recognition is slowly but surely gaining ground amongst supply engineers.

At the present time it is customary to assume one value of soil thermal resistivity, "g," regardless of location, and to design a cable installation on that basis. The value generally used in Great Britain is 120°C cm/W, although ERA Report F/T 183[1] includes current rating tables based on two assumed values of soil thermal resistivity, 90°C and 120°C cm/W. In other countries different values are used; for instance in Germany a value of 70°C cm/W and in France 85°C cm/W. The wide variation in practice between different countries is a clear indication of the need for using values of soil resistivity based on actual measurements instead of on empirical figures.

Soil Investigations

Most of the investigation work on soil thermal resistivity has so far been carried out in Great Britain and America and the present position has been publicised recently in two papers, one British[2] and one American.[3] These papers were presented in 1960 practically simultaneously, one in Paris during the CIGRE and the other in Atlantic City at the AIEE Summer Convention.

In Great Britain, the main investigations have been into the natural soil conditions and to assess thermal resistivities assuming re-use of the soil actually excavated and disregarding any special soil which may be used immediately around the cable for protective purposes. In America, on the other hand, an important part of their investigations has been to discover types of soil which can be used to replace the excavated soil in order to give lower overall soil thermal resistivities. Otherwise, it is interesting to find from study of the papers that the investigations, while carried out independently, have reached similar tentative conclusions and agree broadly on the basis for future work.



Graph showing variation of price with "g" for oil-filled cables. Prices include materials and installation and are based on continuous loading conditions

The CIGRE paper 214[2] reviews the present position and shows that much more basic information is needed. The techniques of soil thermal resistivity measurement with a needle probe under controlled conditions have been developed to an acceptable standard and can be completed reasonably quickly in the field. Similarly, a satisfactory method for the measurement of soil moisture content has been developed.

The effect of moisture on soil thermal resistivity is widely recognised, but information is available for only a few soils. The extent to which one may expect moisture content to vary with season or environment is not sufficiently well known and is confined to a few types of soil in certain localities. Finally, the effect of cable heating on the moisture content of different types of soil has only recently received detailed attention.

CABLE QUESTIONNAIRE SEEKS SOIL THERMAL DATA

Through the questionnaire opposite, a group of British engineers seek co-operation from supply engineers and organisations at home and overseas in collecting data on soil thermal characteristics. Full use of these properties can yield substantial capital savings on h.v. cable schemes. Data will enable charts to be prepared to assist engineers in the design of more economical installations in the future.

Please send the completed form with any additional comments to: The Secretary, CIGRE British National Committee (Paper 214-1960), Thorneycroft Manor, Dorking Rd, Leatherhead, Surrey, England.

Classification of soils has until recently been carried out by civil engineers using, for example, the Casagranda system.[4] This system is used by engineers interested in the mechanical properties of the soil. Such classifications are rather too detailed to be of use to cable engineers, who are primarily concerned with thermal characteristics. However, a simplified method of classifying soils into groups has recently been devised for the benefit of cable engineers by ERA and it is described in their Report F/T 198.[5] So far, this classification is based upon physical properties and is a first step towards grouping and classification by thermal properties.

Cable engineers who wish to secure maximum economy by basing cable sizes on actual measurements made with soil from prospective routes will thus find that at the present time they have not available sufficient basic data for a proper engineering assessment and that the following additional information is needed:

(a) Much more general information on the variation of thermal resistivity for the different types of soils with different moisture contents.

(b) Much more general information on the variations of the moisture content of different soils due to seasonal changes, or to moisture movement as a result of the heat dissipation from a loaded cable.

QUESTIONNAIRE ON: SOIL THERMAL RESISTIVITY FOR DIRECT BURIED CABLES

1. What is the standard value of soil thermal resistivity used?

2. Do you make soil thermal resistivity tests or assessments on all cable routes:

2.1. For determining the conductor section for new installations? YES/NO

2.2. For record purposes when the trench is excavated before cables are laid? YES/NO

2.3. As a basis for reassessing current ratings in the case of existing installations? YES/NO

3. When tests are carried out, what procedure is adopted:

3.1. Number of tests per mile of route length?

3.2. Depth at which tests are made?

4. What method is used for determining soil thermal resistivity:

4.1. Probe (transient) technique? YES/NO

4.2. Sphere or cylinder (steady state) technique? YES/NO

4.3. Cable sample method? YES/NO

4.4. Calculation, using soil density, moisture content, composition? YES/NO

4.5. Application of ERA nomogram (F/T 181)? YES/NO

5. Do you classify soils into groups by inspection:

5.1. By the ERA method as in their report F/T 198? YES/NO

5.2. By any other method?

6. What method of test for soil moisture content is used:

6.1. Samples from site taken to a laboratory and tested? YES/NO

6.2. Samples assessed on site, if so, by what method?

7. In deciding the thermal resistivity for choosing size of cable to be used, do you attempt to correct the test values for:

7.1. Seasonal variation of moisture content (water table, rain, etc.)? YES/NO

7.2. Environment (presence of trees, nature of surface)? YES/NO

7.3. Local drying due to cable heating? YES/NO

7.4. Density of soil removed during excavation? YES/NO

8. Do you improve the thermal resistivity of the soil by using any special form of backfill? If so, please give details.

9. Have any cable failures occurred in service due to overheating?

Undertaking: ..... **Address:** .....

Authorised by: ....

Position: ..... **Date:** .....

To be returned to: The Secretary, CIGRE British National Committee (Paper 214—1960), Thorneycroft Manor, Dorking Road, Leatherhead, Surrey, England

PLEASE CUT OUT

(c) A classification of soils into groups based on their thermal characteristics only.

(d) A method of identifying a soil into one of the above groups by subjective examination, e.g., sight and touch.

Future Research

A programme of research in Great Britain has accordingly been suggested, leading up to the preparation of what might be called a "Soil characteristics chart" for the use of cable engineers.

It has been proposed that tests be carried out in the laboratory to establish curves showing the moisture content/soil thermal resistivity characteristics over a wide range of soils and soil mixtures between limits of dry density.

It is proposed that these curves should then be sent to a panel of cable engineers to be classified by them into groups so arranged that all the soils in any group could be treated by them as identical for the purpose of assessing "g." This important task would, incidentally, indicate the limits of error within which cable engineers are prepared to work when assessing the value of "g."

Soil research engineers would then have to devise a scheme for classifying soils in these new groups by subjective examination.

As and when such a research is completed, placing a soil into a group by examination on site would enable the cable engineer to select the curve showing its characteristics. The general pattern of this curve, together with the value of "g" and the moisture content value received from site tests, would enable the cable engineer to prepare curves for the soils with which he is dealing.

When more information on (a), (b), (c), (d) above is available an engineering approach to the assessment of soil thermal resistivity will be possible from basic data modified to take account of local soil conditions, the heating effect of the cable and seasonal variations.

Co-operation will Accelerate Progress

An organised effort is being made in Britain towards amassing information required to produce the "Soil characteristics chart," but progress in this respect would be expedited if the results of independent surveys could be collected and analysed.

Therefore, information given in answer to questions on the detachable sheet would be of great value to the authors of CIGRE Paper 214[2], who have also prepared this article.

The importance of obtaining agreement on methods of assessment internationally is widely accepted, and the above-mentioned questionnaire is also being submitted to an international committee for consideration.

With a view to covering as wide a field as possible, it would be appreciated if supply engineers and others interested would be good enough to detach and complete the questionnaire and send it with any further information or comments to the address stated.

REFERENCES

1. ERA Report Ref. F/T 183: "Current Ratings of Paper and Varnished Cambric Insulated Cables to British Standards, 1955."
2. CIGRE Paper 214—1960: "Soil Thermal Resistivity. A Practical Approach to its Assessment and its Influence on the Current Rating of Buried Cables," by R. S. Orchard, Merz and McLellan; C. C. Barnes, CEGB; P. M. Hollingsworth, BICC; and K. Mochlinski, ERA.
3. AIEE Trans., Paper 60-785: "Soil Thermal Characteristics in Relation to Underground Power Cables."
4. Casagranda, A.: "Classification and Identification of Soils." Proc. Amer. Soc. Civ. Eng., 1947.
5. ERA Report Ref. F/T 198: Soil Classification for Cable Engineers."

Aerodrome lighting guide

REVISED B.S. TAKES ACCOUNT OF AVIATION DEVELOPMENTS

THE importance of standardisation for airfield lighting throughout the world can hardly be overstressed. It is with this precept in mind that the British Standards Institution has prepared their revised edition of the "Guide to Civil Land Aerodrome Lighting" (BS 1332: 1960).

The guide was first published in 1932. The revised form is based on Annex 14 (third edition 1958) of the International Civil Aviation Organisation (ICAO). The ICAO is constantly endeavouring to standardise systems of aerodrome lighting used throughout the world, particularly their lighting patterns and colour coding, although it is, of course, unavoidable that for operational reasons the scale of lighting necessary varies from one airport to another. However, in addition to the Calvert system used in this country, Annex 14 recognises the ALPA system and also certain methods of emphasising the runway threshold. These have not been adopted in British practice.

The guide relates to aerodromes for fixed wing aircraft since, as yet, there is no international standard giving recommendations for helicopter stations. However, it is hoped to include these at a later date. The guide is in 12 sections covering definitions, general requirements and the various forms of beacons, approach, taxying and obstruction lighting. Reference is made to types of circling, guidance and runway lighting which are still undergoing development and operational evaluation, but which have recently been included in Annex 14. They include the two-colour angle of approach indicator developed at RAE Farnborough, which is now being installed at several civil airports in this country. This system has also been subjected to flight trials in America and has now been adopted by the Federal Aviation Agency.

Another important aspect of airfield lighting is the provision of improved indication of runway surface to meet the increased approach speeds of modern aircraft. Greater intensity of approach and runway edge lighting has been necessary to meet this need and also to improve bad weather approach techniques. The first scheme to meet this requirement consisted of runway surface lights over the length of the touch down zone and was installed first at Gatwick and later at Prestwick. Further experience has shown that, particularly for take off in low visibility, it is also an advantage to have additional lights defining the centre line of the runway.

The higher speeds of modern aircraft has meant an increase in their circuit pattern, so making it more difficult for a pilot to position his aircraft in correct relation to the runway. A system of high intensity lights facing outwards along the runway or approach can meet this requirement.

Sizewell contract placed

SUFFOLK NUCLEAR STATION RATED AT 580 MW

SIZEWELL nuclear power station, seventh to be built in Great Britain, is to be designed and constructed by the English Electric—Babcock and Wilcox—Taylor Woodrow Atomic Power Group. Last week the CEGB indicated its intention of placing a contract with this group for a station with a net electrical output of 580 MW, to be built on a site on the Suffolk coast north of Aldeburgh. The two reactors of the gas-cooled, graphite-moderated natural uranium reactor are due to be commissioned in 1965 and 1966, respectively, and the contractors estimate that building will begin next April. Value of the contract is £55 million.

Design Details

Preliminary design details of the station indicate notable advances on previous techniques. That most apparent from the external appearance of the station will be use of a single reactor building to contain both reactors, with a single-pile cap area served by 250-ton main cranes. A turbine-house for two 325 MW turbo-alternators will be arranged parallel to the reactor-house, both being at right angles to the sea. In construction of the station, use will be made of the Goliath crane currently engaged in erection of Hinkley Point. The crane will be dismantled and re-erected at Sizewell; 275 kV switchgear will be housed in a building to the west of the station.

The table on page 841 gives leading technical details of the Sizewell design. Each of the reactors is contained by a spherical pressure vessel 4 in.-plus thick, with the graphite core supported on an orthogonal lattice of Warren girders. The 11 ft 9in. roof over the reactor pressure vessels extends over the area between the reactors. Control, service plant and fuel store rooms will be placed between the reactors. A supplementary biological shield is to be placed around the main shield to mask the major openings for coolant gas and air ducts. Common working of the pile cap area will permit use of a single central fuel discharge system, with only one compact cooling pond.

Higher heat ratings are claimed for the fuel elements as compared with previous designs put forward by the group. The Magnox fuel cans will have multiple-start helical fins giving a polyzonal surface. Seven fuel elements are to be stacked in each fuel channel. Fuel loading and unloading will both be carried out from the pile cap.

Reactor operation will be through an automatic control system which effects major changes in heat output by changing coolant gas mass flow. For this purpose a change will be made in the setting of circular inlet guide vanes on the main circulators, with additional use of a gas by-pass system. Reactor outlet gas temperature will be kept steady by adjusting control rods in the reactor, and compensation for effects of xenon formation obtained by permitting the inlet gas temperature to increase.

Nuclear Design Advance

WITH an output rating of 580 MW, Sizewell is the largest nuclear station so far planned. Announcement of the design details provides a convenient occasion for looking at the progress that has been made since the first trio of contracts were placed for nuclear power stations. Those contracts covered Bradwell (300 MW), Berkeley (275 MW) and Hunterston (320 MW), and were placed in December 1956. Next came Hinkley Point (500 MW) in September 1957, to be followed by Trawsfynydd (500 MW) in June, 1959. Last July the Dungeness contract was awarded for a 550 MW station.

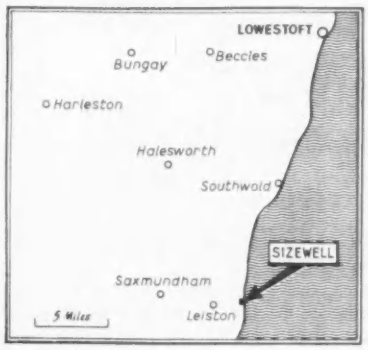
Much of the advance in size has come through attention to engineering details rather than through any major advance in technology. Indeed, in glancing through outline technical details for successive stations, it is notable how little some figures have changed. For example, the diameter of the uranium fuel rod has remained almost constant at 1·1 in., and there has been little alteration in the temperature at which the bulk of the CO_2 leaves the reactor pressure vessel. In consequence, there have been only slight changes in the temperature of the steam fed to the turbines; the range is from 322°C (615°F) at Berkeley, to 392°C (740°F) at Dungeness. Nor has the mass of uranium in each reactor changed as much as might be expected. For Bradwell one load is 273 metric tons, Berkeley 253 and Hunterston 251. Hinkley jumped to 368 tons, but Dungeness secures its output from only 298 tons, and Sizewell from 321 tons.

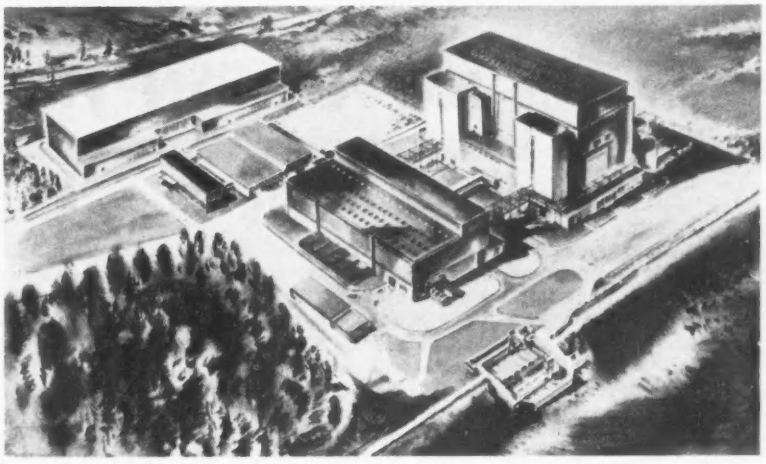
What has changed markedly is the gas pressure permissible, through increase in thickness of pressure vessel which can be fabricated on site. The early stations used in general 3 in. plate for the pressure vessels, with an increase to 3½ in. with Trawsfynydd, and to 4 in. for Dungeness and now Sizewell. This increase has been used to permit higher gas pressures; not to increase the size of the spherical pressure vessel. Indeed, Dungeness and Sizewell at about 63 ft internal diameter are smaller than Hinkley Point and its predecessors.

Gas pressure has climbed sharply, however. For the first stations it was 126 lb/sq in. (Berkeley), 132 (Bradwell), and 150 (Hunterston). Hinkley Point saw an increase to 185 lb/sq in., and Trawsfynydd to 240 lb/sq in. For Dungeness the figure is 283 lb/sq in., closely approached at Sizewell where it is 279 lb/sq in.

Such higher gas pressures mean that higher pressures are possible in the steam cycle associated with the nuclear reactor, and also more mass flow of gas for given power put into the blowers. Whereas the steam pressure at Berkeley is as low as 306 lb/sq in. for the h.p. turbines, at Dungeness it is 1,410 lb/sq in. Sizewell makes a step backwards in this respect, presumably indicating particular confidence in design of the low pressure sections of the turbine shed.

Mastery over steam conditions has brought steady increase in alternator size, with the well-known advantages that follow. The first three stations range from 52 MW to 85 MW. Hinkley Point uses 93·5 MW sets, Trawsfynydd 145 MW. There is not much change for Dungeness (143 MW), but the jump for Sizewell is significant.





Above, the site of the station in relation to surrounding towns. Heavy plant will be brought by sea to Lowestoft, then 26 miles by road to site. Right, artist's impression of the station

There is to be one single-stage axial gas blower for each of the eight boilers (the name the group is using instead of steam-raising unit or heat exchanger). Constant-speed a.c. induction motor drives have been selected, using motors fed through transformers connected to the main generators.

Boilers will be arranged in pairs on opposite sides of the reactor building. They will use low-alloy, high-tensile steel, which is claimed to have advantages in terms of metal weight and thickness. Boiler tube elements are planned in horizontal banks. Through advances in technique, each boiler will produce over half as much steam again as its counterpart at Hinkley Point with a shell only slightly bigger.

A dual-pressure steam cycle is to be used, with a side-by-side superheater arrangement that gives maximum l.p. steam superheat. The number of penetrations into the shell will be reduced by using trifurcations to connect groups of three elements.

The gas by-pass already mentioned is to be included within the boiler shell. Entry of gas into the by-pass passage will be controlled through a valve system actuated from outside the shell through a displaced bellows positive seal drive. Blower, control valve and by-pass system will all be accommodated in the bottom of the boiler shell, with facilities for the whole unit to be withdrawn for maintenance. Boilers are to be shielded.

Generation

Use of only two turbo-alternators, each of 325 MW, considerably reduces the size of turbine-house required. The machines will have in-line tandem arrangement with one h.p. cylinder and multi-double-flow l.p. cylinders. The claim is made that the l.p. cylinders will have the longest exhaust blades yet manufactured. Turbines will be of mixed pressure design to meet the needs of the nuclear reactor operation, and a novel feature will be use of bled steam to reduce exhaust wetness.

Boiler stop valve temperatures and pressures are given in the table. Corresponding turbine figures are 646 lb/sq in. gauge, 700°F h.p. and 253 lb/sq in. gauge, 700°F l.p.

Each of the three-phase, 50 c/s alternators is rated at 382 MVA for 0·85 p.f. lagging. Generation will be at 17·5 kV, with water-cooled hollow stator conductors and 45 lb/sq in. hydrogen cooling for the stators.

Connected to each alternator will be a 340 MVA 17·5/295 kV transformer with 275 kV cables to the switch compound, where there will be connection with the super-grid. The switchgear is the subject of a separate contract.

Cooling water will be obtained through an intake structure 1,800 ft offshore, connected through twin 10 ft diameter tunnels to the turbine-house. Further tunnels will take the discharged water 500 ft out to sea.

Technical Details of Sizewell Power Station

Station	
Net electrical output	580 MW
Net thermal efficiency	30·5 %
Reactors	
Number of reactors	2
Reactor heat rating	950 MW
Pressure vessel diameter	63 ft 6 in
Pressure vessel thickness	over 4 in
Coolant	CO_2
Reactor inlet pressure	279 lb/sq in. abs.
Fuel	Natural uranium
Fuel rod diameter	1·1 in
Fuel charge/reactor	321 tonnes
Mean fuel heat rating	2·95 MW (heat)/ tonne
Number of elements per channel	7
Boilers and Turbines	
Number of boilers	8
H.P. drum pressure	720 lb/sq in. abs.
H.P. superheater outlet temperature	391°C
L.P. drum pressure	305 lb/sq in. abs.
L.P. superheater outlet temperature	390°C
Steam pressure at h.p. boiler stop valve	677 lb/sq in. gauge
Steam temperature at h.p. boiler stop valve	389°C
Steam pressure at l.p. boiler stop valve	268 lb/sq in. gauge
Steam temp. at l.p. boiler stop valve	389°C
Vacuum	29 in. Hg
H.P. steam flow from each boiler	540 klb/hr
L.P. steam flow from each boiler	190 klb/hr
Boiler dimensions	91 ft 6 in. by 22 ft 6 in.
Number of main turbines	2
Output of each turbine	324·75 MW
Main Circulators	
Number of circulators	8
Type of circulators	Vertical, single stage axial, with variable stagger inlet guide vanes.
Drive	Vertical squirrel-cage induction type motor.
Civil Engineering Data	
Height of reactor building	193 ft
Length of reactor building	400 ft approx.
Mean thickness of concrete main shield	5 ft 6 in.
Mean thickness of concrete supplementary shield	5 ft
Thickness of pile cap	11 ft 9 in.
Turbine hall overall dimensions	Approx. 385 ft x 155 ft wide x 94 ft high

NOTES ON WIRING

BY MEGOHM

WE are gradually getting used to meeting new words in these modern days and one which seems to be coming into use in many fields is "silicone." We find that the furniture polish used in the home contains this useful component and we are assured that it is only necessary to use the polish every six weeks. We meet silicone products in the electrical field also and one instance of its use is in the manufacture of cables which will stand up to very high temperatures, 200°C, and yet remain flexible in a temperature of −70°C. They are claimed to resist weathering, ozone and oxidation, low-pressure steam, water and many chemicals. In high temperatures they resist electrical fatigue and corona discharge. It is even said that they will continue to operate efficiently even if subjected to extreme heat in an outbreak of fire.

We already know the claims for m.i.c.c. cables in hot spots, and it would appear that much is being done by various manufacturers to assist the electrical industry to overcome, and even defeat, the usual cry when a fire occurs that the electrical wiring was the cause. We have progressed rapidly in the last few years in protective apparatus as well as cables and possible fire danger can largely be eliminated on an installation. There are, of course, many other factors which come into play, including the human element. There is also cost to be considered, and I regret to note that the electrical installation is still the first section of a building to come under the financial axe when economy is called for. Time and time again this happens, and unless the work is kept under strict supervision many things can take place which could, and often does, lead to trouble. There are still contractors who skimp the installation when such situations arise.

Boiler-houses

Keeping to "hot spots" as it were, I was in the company of some contracting friends discussing the various trends of thought regarding wiring in boiler-houses. I think the conversation started through the mention of carrying out work for different county councils, and the different ideas in the various specifications. The majority of municipal engineers appear to agree that m.i.c.c. cables are the ideal thing for boiler-houses but that is as far as it goes. Certain of them allow the m.i.c.c. cable to be taken right into thermostats, motorised valves, etc., providing the conductor tails are sleeved with silicone or other similar sleeving. Others insist on the m.i.c.c. cable terminating about 18 in. from the apparatus and continuing to the terminals in asbestos flexible or similar heat-resisting cable. I, personally, have found that it is quite practical to take the m.i.c.c. cable right into such units, leaving a small single, or double, loop of cable at the position which will allow easy disconnection in the event of trouble.

Another matter raised was that one local authority required the m.i.c.c. cable, when installed in coke-fired boiler-houses, to be painted with bitumastic paint. I would have thought that a p.v.c. serving would suffice in such situations, for I have used this in much more corrosive atmospheres with satisfactory results. Of course, engineers do have their own ideas and if they are in a position of authority then these ideas become more or less law. It has to be admitted, however, that many of these ideas are based on practical experience.

The discussion went on, away from local authorities, to general matters and in particular the neutral bar and its connections. I was impressed by the number of these engineers who consider that it should be standard practice for fuseboards to have a neutral bar with one connection per fuseway so that the neutral can be easily removed when that particular circuit is being tested. I quite agree with this suggestion and whenever possible I try to install fuseboards with such facilities. Many manufacturers do not provide such requirements, yet the extra cost involved in doing so must be negligible.

Other manufacturers go further than providing one neutral connection per fuseway and offer a hinged neutral link, which means that there is no need to disconnect the cable at all. I have seen these fuseboards installed in large stores, technical schools and factories and the resident electricians were full of praise for them. Regular testing of circuits connected to these fuseboards is simplified.

Smokeless Zones Again

Some weeks ago I mentioned the smokeless zone (or smoke control area, more correctly) in connection with the question of installing switch sockets. At that time, although I did not say so in these columns, the matter of the possible purchase of smokeless fuel was gone into before the decision was reached to use electricity. I have no experience of such fuel, but I do know that the Clean Air Act calls for fire without smoke even at the lighting stage. This presents a problem in itself, and it is interesting to note that the new electric firelighter has appeared to assist in the matter. The unit has a fan which blows air over a 1,800 kW element. Safety measures include a master key for switching the unit on, while the outer case is kept cool by passing a jet of cold air between the outer case and the inner element case.

New Products

I received details of some new products this week the prototypes of which were on view at the last Electrical Engineers' Exhibition and are now available. One is a three-gang plateswitch which is the same size as the single-gang plate and this should prove extremely useful in housing work. The plate has $2\frac{3}{8}$ in. fixing centres and the accessory is suitable for plaster-depth boxes. The switches themselves are two-way type but can be wired as one-way. They are available in brown or ivory and are styled to match the other accessories of this now well-known range. Also available are the moulded flanged boxes for recessing into skirtings without the need to cut a precise hole. These are fixed into place at the corners.

The third item is a range of plaster-depth and deep boxes and clamps for use with m.i.c.c. cable. The clamps are separate and can be fixed to the boxes as required by means of screws and shakeproof washers. The clamps are, I might add, of the type which clamps both the cable and the pot. I shall say no more at the moment for I understand there is some controversy about the best method of bonding m.i.c.c. cable at box terminations.

Generation by free piston engines

FUTURE COMBINATION WITH STEAM CYCLE LIKELY

ELECTRICITY generation by gas turbine-driven alternators operating in conjunction with free piston engines is being increasingly used. The scheme is outlined in a paper presented last Friday to the Manchester Association of Engineers.*

For this particular application the free piston engine operates as a gasifier, supplying heated and pressurised gases to the gas turbine which in turn, drives the alternator. The free piston engine has several valuable features, notably its freedom from vibration and light weight. It is also relatively easily and quickly maintained by comparison with a diesel engine.

Free piston engines manufactured by The National Gas and Oil Engine Co. are in use for electrical generation in installations ranging from a single, 600 kW unit to a power station producing 36 MW. This station has 48 gasifiers supplying six, 6 MW gas turbo-alternators. These gasifiers are rated at 1,250 gas h.p. and although larger units are under consideration by several makers, so far as is known they are not yet out of the development stage.

Operation of Gasifier

The operating principle of the free piston gasifier is illustrated in Fig. 1. The engine is started by admitting compressed air to the pressure cylinders 9, so forcing the pistons, 2, together and compressing a mixture of air and fuel contained in the engine cylinder, 1. The pistons, 2 are only constrained by a light linkage to ensure that they move in unison, but this linkage transmits none of the machine output power. An important advantage of the machine is the absence of connecting rods and crankshafts. In consequence, there are no major out-of-balance forces which could cause vibration.

Fuel is admitted through the injector, 3, and ignition takes place with the scavenge and exhaust ports, 7 and 8, covered. The pistons are driven outwards compressing air in the cushion space 9 preparatory to their return for the next stroke. As the pistons move outwards, air is drawn into the compression cylinders, 4, through the suction valves, 5. Shortly before outer dead centre, the exhaust ports, 8, are uncovered and the gases pass to the gas collector, B. Subsequently, the scavenge port 7 is uncovered and compressed air from the engine case scavenges the cylinder, and mixes with the combustion gas to give a gas-air mixture in the gas collector at 45 lb/sq in 850°F for driving the turbine C. Air compression in the cushion space, 9, brings the pistons to rest at the outer dead centres and then returns them to commence the next cycle.

The free piston gasifier had both upper and lower limits to the mass flow it can deliver. The upper limit is set by the maximum stroke which can be tolerated, while the lower limit is determined by the minimum stroke to avoid bad scavenging caused by partial uncovering of the ports. If therefore, the turbine is to operate on low load there must be provision for by-passing that portion of the gasifier minimum delivery not required by the turbine.

This could be accomplished by a blow-off valve, but a better way, if the engine is to idle for long periods, is to return part of the scavenged air from the engine case to the engine compressor intake. This technique reduces no-load fuel consumption from 175 to 30 lb/hr and mass flow to about 15% of that at full load.

Free piston gasifiers operating in conjunction with gas turbines deliver about 1,000 h.p. at the turbine shaft for a gas h.p. of 1,250. Up to ten gasifiers may supply each turbine through a common gas collector. The gas collector also serves to damp severe variations of gas pressure at the turbine stop valve.

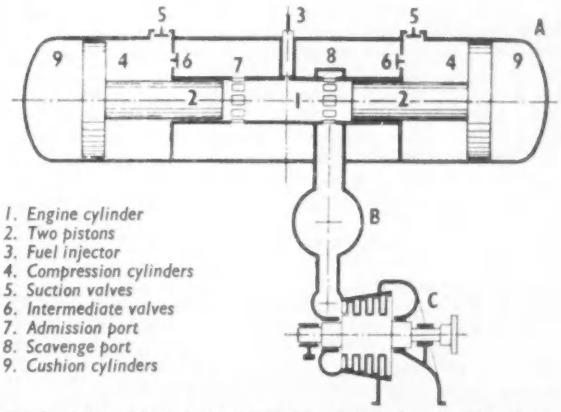


Fig. 1. Section through the free piston gasifier, A; showing the gas collector, B; and the gas turbine, C

The paper described a 6 MW station comprising eight, free piston engines supplying one gas turbo-alternator. Total weight of each gasifier is only 8 tons so that light foundations are possible. With the turbo-alternator, total weight of machinery is 155 tons or 57½ lb/kW. By providing one standby gasifier so that normal maintenance can be carried out on load, 100% availability is possible with a multi-unit station. Shortness of maintenance time possible is indicated by only 2 hours from shut-down to restart to make two piston ring changes.

Future Developments

Where large power outputs are required, there is scope for combining the gasifier cycle with steam plant. The gasifier exhaust gases contain about 80% unburnt air. It would therefore be possible to burn additional fuel, either before or after the turbine, in a steam boiler. For example a 25 MW plant using four gasifiers would yield four times the power obtainable from the gasifiers alone by using a high-pressure boiler between them and the turbine, generating steam at 570 lb/sq in. and 930°F. Overall efficiency would be 34% compared with 34½% for the gasifier alone and 28% for the steam plant alone.

* "The Free Piston Engine," by W. Lowe, B.SC., A.M.I.MECH.E., A.M.C.T. Mr Lowe is chief development engineer, The National Gas and Oil Engine Co. Ltd.

OVERSEAS NEWS

from our correspondents abroad

CANADA

Quebec Annual Report

The financial position of the Quebec Hydro-Electric Commission for the year ended 31 Dec., 1959, was referred to in ELECTRICAL TIMES for 3 Nov. The report also outlined technical progress during the year. Peak load on the consolidated system was 2,168 MW, an increase of 8·7% over 1958. During the year the first five of the 11 generators at the Beauharnois hydro-electric station were installed. Each generator has a rating of 73,700 h.p. and this station will eventually be the largest in Canada. At Bersimis 2 station, dam construction was completed and three of the five 180,000 h.p. generators brought into use. The 391 mile transmission line operating at 300 kV linking this station with Quebec City and Montreal was also completed. The line included a three-mile crossing of the St. Lawrence, erected on five towers nearly 400 ft high. A further 300 kV line from the station to Hauterive was terminated. This line will provide additional power for the British Aluminium Co. Baie Comeau Works. During the year the Montreal head office telephone exchange was re-equipped and now has micro-wave communication with Beauharnois, Bersimis, Forestville and Quebec.

New Brunswick Revenue Up

Total revenue for the year ended 31 March, 1960, of the New Brunswick Electric Power Commission rose to $16·7 million. After allocation of $384,000 to reserves, $249,000 remained for transfer to the surplus account. The increase in revenue represents 23·2% over last year, but this was in part due to acquisition during the year of the Grand Falls Plant of the Gatineau Power Co. and associated distribution networks. Generation and purchase of the power rose to 1,185 million kWh and the number of consumers also increased by 16% to 100,745, largely due to acquisition of distribution facilities in the City of Moncton. Acquisition of the Grand Falls hydro-plant raised the Commission's installed capacity to nearly 271 MW. This will be supplemented in August, 1961, by the 250 MW station at St. John. During the year, most of the 35 miles 138 kV line from Moncton to Nova Scotia was completed and construction work began on the further 68 miles from Fredericton to St. John. Increased use of automatic reclosing equipment on h.t. line and use of air patrols had reduced system interruptions by 27% on last year. As part of their effort to improve wiring standards in the province, the Commission have introduced a wiring finance plan whereby customers can finance, by low monthly instalments, the cost of rewiring their premises.

Aluminium Pylons

A lightweight all-aluminium transmission tower designed by Aluminium Co., of Canada, for erection in rugged country is undergoing tests by International Power and Engineering Consultants at Vancouver. The tower may be used for the Columbia River scheme. Total weight is only 3,800 lb and it can be moved to site by helicopter. It has two legs which can be erected in "V" shape or with legs apart depending on the terrain. For either arrangement, only one base is needed. The tower is over 100 ft high and, although costlier to manufacture than a comparable steel tower, it is claimed to be cheaper to erect.

WEST INDIES

Barbados Reaps Development Benefits

Following their acquisition last year of the whole ordinary share capital issue for the Barbados Electricity Corporation, the Mitchell Engineering group have forecast an increase in their number of consumers by the end of the year to 20,000. A representative of the Mitchell group is at present reviewing the expansion plans on which $240,000 has been spent in the last two years and the intention has been stated to spend a further $385,000 in the next nine months. It will be recalled that some time ago, the Mitchell group, who are in association with the US firm AMF Atomics, were reported to be considering construction of a nuclear power station in Barbados.

Generating Plant Takeover

Takeover by the Government of the Canadian-owned Demerara Electric Co. is expected to be completed by the end of this month. Towards the end of October, a White Paper was put before the Legislative Council setting out arrangements for purchase of the company and the establishment of a seven-man Electricity Corporation Board to administer the undertaking. It is proposed to finance down-payment by a loan of £250,000 from Barclays Overseas Development Corporation, repayable in ten years and bearing an interest of 7%. Future plans provide for extension as soon as it is economically practicable into rural areas followed later by more general rural electrification. Hydro-electric possibilities are also being investigated.

New Jamaican Power Station

Savanna-la-Mar now has a 1·1 MW diesel generating power station, which was opened recently by the Minister of Trade. The new station, at Paradise, replaces an old unit which was closed down on 10 Aug.

Grenada Expansion Programme

Arrangements have been completed by the Colonial Development Corporation and the Government of Grenada to expand the island's electricity supply and distribution system. A new company has been formed jointly by the Grenada Government and the Corporation, named Grenada Electricity Services Ltd. This company will take over the Government's existing undertaking, which has an installed capacity of 0·9 MW. The expansion programme provides for distribution networks to towns not at present serviced and an increased generating capacity. Further diesel generating sets are expected to be installed by the end of the year and an investigation is to be undertaken on the relative merits of hydro-electric or diesel power generation for future expansion. The new company has an issued capital of £143,442 representing the value of the Government's assets and £200,000 issued by CDC. The Corporation is also lending a further £50,833 for completion of the expansion programme.

INDIA

Request for Consultants

The Bihar State Electricity Board invites firms of consulting engineers to offer their services for the design, coordination, construction and commissioning of two steam power stations during the third Five Year plan. The projects cover augmentation of the Barauni station by approximately 100 MW and the Pathratu station by approximately 250 MW to 300 MW. Details of the consulting ser-

vices required are obtainable from the Electrical Superintending Engineer, Planning and Project, Bihar State Electricity Board, Patna. Tenders are to be submitted in triplicate to the Additional Chief Engineer, Bihar State Electricity Board, Patna, before 28 Dec., 1960. Tenders to be superscribed "Tenders for consulting services for Steam Power Stations" with the name of the tenderers stated on the cover.

Cable-making Plant

Orders for plant worth £352,000, to be installed in a new cable-making plant, have just been placed with two British firms by Industrial Cables (India) Ltd. in association with Bahrad Steel Tubes. The General Engineering Co. (Radcliffe) Ltd. are to supply impregnating plant for paper-insulated cables, and lead sheathing and presses, together with ancillary equipment. Stranding machinery is to be provided by the Trafalgar Engineering Co. Ltd. The plant is scheduled for delivery next August.

PAKISTAN

Austrian Technical Aid Offer

After visiting the Warsak hydro-electric project, the new Austrian Ambassador to Pakistan offered technical equipment and assistance for hydro-electric, irrigation and nuclear projects. He said that, although no formal negotiations had so far been conducted with WAPDA, Austria was impressed by the sincere desire of the Pakistan Government to develop the country's resources, and Austrian firms and capitalists would be prepared to invest in Pakistan, providing equipment on deferred payment schemes. The Warsak project was a combined operation by Pakistan and Canadian interests.

JAPAN

Thermal Generation Projects

Under their recently announced long-term development programme extending over the next ten years, the Kansai Electric Power Co. will install 5,000 MW of plant. A feature of the project is a change of policy from hydro generation to thermal generation burning heavy oil. This change has been prompted by lack of hydro resources available for economic power production, reduced cost of generation by using heavy oil and a prediction, by the company, that price of petroleum can be expected to fall in the future. 80% of the project covers oil-burning stations in four main centres. A 600 MW station, later to be extended to 1,000 MW, will be constructed at Sakai and is planned for completion in 1970. At Osaka, a 600 MW plant will be established on land reclaimed from south of the port. Work is expected to begin on a second 1,200 MW station in the Himeji district this year and a 500 MW station will also be constructed at Nishinomiya. Agreements with three large oil companies are being considered in connection with the fuel supply to these stations.

AUSTRALIA

Mackay Supply from Queensland

Under a draft agreement adopted recently by the Mackay Regional Electricity Board, they will construct an interconnector linking with the North Queensland electricity system. The interconnector will operate at 66 kV and is expected to be completed by 1962. It will link with the Townsville Regional Electricity Board's system and will comprise the following constructional work. Extensions of 132 kV busbars to Garbutt, construction of a 132 kV line from Garbutt to Clare and a 132/66 kV substation at Clare. A 66 kV line from Merinda to Proserpine will actually link the two systems. Load on the interconnector will be approximately 8 MW and it will serve to reinforce the Mackay system until a new power station, whose site has not yet been chosen, comes into operation in 1968.

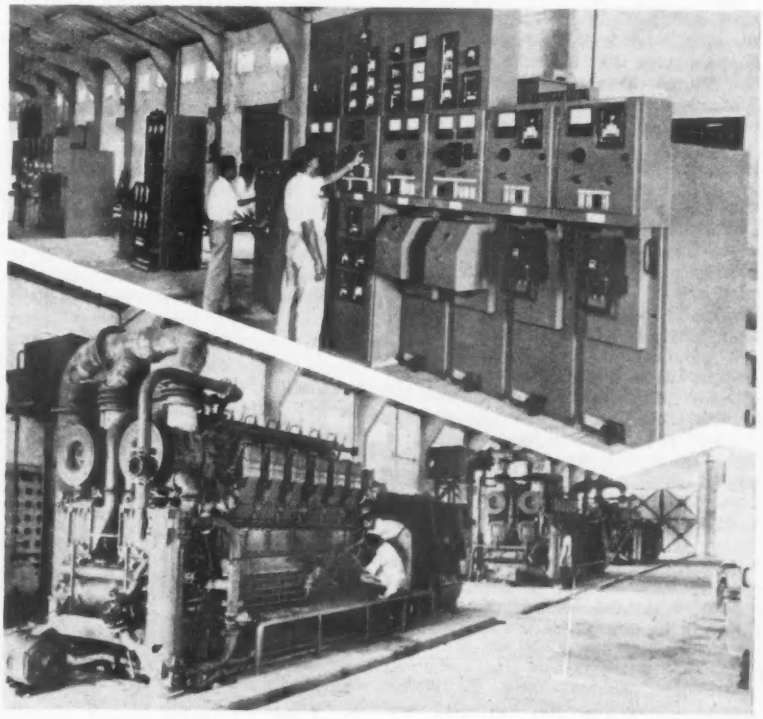
Rail Loco Order Doubled

An order placed by the Queensland Government with English Electric of Australia for five locomotives has recently been doubled. Increased traffic on the Townsville-Mt. Isa line has shown that the first batch of locomotives, now in their final stages of construction, would be inadequate.

NEW ZEALAND

Microwave Telephone in Service

A two-way radio link capable of carrying 600 simultaneous telephone calls now links the New Zealand capital, Wellington, with Auckland, 262 miles distant. The microwave link was supplied by Standard Telephones and Cables Ltd. and operates in a very narrow beam at 4,000 Mc/s. The link requires only 5 W of transmitted power and includes eight repeater stations carried on 80 ft high masts. The micro link is designed to carry television programmes at a later date if required and there are also spur connections to Urenui and New Plymouth. The installation includes "no-break" power supplies and automatic supervisory equipment using VHF radio for reporting and identifying repeater station faults.



MOBILE SUBSTATION

Two emergency standby mobile diesel generating plants have recently been supplied by English Electric to Neyveli Lignite Corporation, Madras. Each substation includes three diesel alternator sets with associated switchgear. The diesel engines are turbo-charged and have a rating of 1,498 b.h.p. They are directly coupled to 1,037 kW alternators generating at 11 kV, three-phase 50 c/s. The switchgear consists of six panels for exciter control, alternator and transformer connections and outgoing feeders. Supply is taken from the panels by 3-core, 11 kV flexible cables in standard length with plug and socket connectors. The mobile stations are designed to start automatically on failure of supply, and when running at the correct speed the transformer breaker is tripped and the alternator breaker closed through electrical interlocks. Restoration of the normal supply is carried out manually

Personalities *in the industry*

Mr A. L. G. Lindley

Mr A. F. Miller

Mr S. McD. Gemmell

Mr H. A. Coates

Mr G. D. Kelly

Sir William Strath has been appointed to the board of Tube Investments as from 1 Jan., 1961. He will also be joining the board of the British Aluminium Co. Ltd., of which he will become managing director. **Lord Plowden,** who is now chairman and managing director of the latter company, will remain chairman. During the war Sir William served in the Ministry of Aircraft Production and from 1945 to 1947 was with the Ministry of Supply. In 1949 he was appointed a member of the Economic Planning Board until 1955. He was a full-time member of the UK Atomic Energy Authority from 1955 to 1959.

Mr A. L. G. Lindley, M.I.MECH.E., has been elected chairman of the General Electric Co. Ltd. to succeed **Sir Leslie Gamage,** M.C., M.A., on his retirement at the end of the year. Mr Lindley will continue as managing director of the company. Born at Abbey Wood, Kent, in 1902 he joined the GEC as an engineering apprentice at the Erith Works in 1918, and studied at Woolwich Polytechnic. His ability at mathematics and his interest in engineering projects, which demanded meticulous work, soon established for him a high reputation in the turbine and heavy engineering design departments. His success, in fact, took him out of England. In 1932 he was transferred to South Africa and he became chief engineer of the British General Electric Co., of South Africa. Shortly afterwards he was appointed a director and assistant general manager of the South African company. He was also appointed a director of the East Rand Engineering Co. and in this capacity pioneered the manufacture in South Africa of heavy mining and other mechanical equipment. His work led to the expansion of these industries by the South African Government, which asked Mr Lindley to advise on the equipment and layout of new heavy engineering works. These activities necessitated frequent trips to England. On one of these, Mr Lindley narrowly escaped being caught in Rome immediately before Italy entered the war in 1940. He was recalled from South Africa in 1949 to take up the appointment of general manager of the GEC heavy mechanical engineering works at Erith, which he reorganised and expanded to meet the demand for the largest power generating units. He was appointed a director of the GEC in 1953. On Mr Lindley's recommendation the company entered the new field of nuclear energy in 1954 and developed designs for complete nuclear power stations and he became responsible for the company's nuclear energy interests. In 1958, he was made an assistant managing director in charge of the company's heavy engineering group, and in June, 1959, he became vice-chairman and a managing director. Since July last he has been the sole managing director. Mr Lindley is now an internationally known figure in the nuclear energy and engineering world and has frequently visited the US, Canada, South Africa, Australia, India and the Western European countries to discuss with engineers and scientists the development of nuclear power in their areas.

British Insulated Callender's Cables Ltd. announce the appointments of **Mr A. F. Miller** and **Mr S. McD. Gemmell,** respectively, as managers of its Glasgow and Aberdeen branches. Mr Miller, who was educated at Leigh Academy and Heriot-Watt College, Edinburgh, joined the former Callender's Cable and Construction Co. Ltd. at Edinburgh in 1938. He served during the war with the Royal Scots and Royal Engineers, after which he rejoined the Edinburgh branch as a sales representative. In 1957 he was appointed branch manager in Aberdeen. Mr Miller succeeds **Mr H. Thomson,** who has been released for specialist duties with BICC's North East Regional manager. Mr Gemmell, who succeeds Mr Miller as branch manager in Aberdeen, was educated in Aberdeen and received his electrical training with the former British Insulated Cables Ltd., which he joined in 1940. Before taking up his new appointment he was a sales representative attached to the Aberdeen branch.

The Eastern Electricity Board have appointed two new district commercial engineers: **Mr K. W. Brown,** at Luton, and **Mr N. G. Stevenson,** at Chelmsford (*ESH, pages 106, 107). Mr Brown fills the vacancy caused by the appointment of **Mr P. B. Clarke** as senior assistant commercial engineer (industrial power) at the Chilterns sub-area headquarters. Mr Brown was previously first assistant district commercial engineer at Luton, having earlier served with the London Electricity Board. Mr Stevenson, who is succeeding **Mr R. T. Harper,** ASSOCIATE I.E.E., on the latter's retirement at the end of this year, is now first assistant district commercial engineer at Chelmsford and prior to joining the Board in 1958 was with the Midlands Electricity Board.

Mr John A. Howie has resigned as managing director and from the board of Lightfoot Refrigeration Co. Ltd. Mr Howie joined Lightfoot Refrigeration in November, 1955, after being general works manager of Enfield Cables Ltd. for about four years.

Chief accountant of Measuring Instruments (Pullin) Ltd. since 1944, **Mr H. A. Coates** has joined the board of directors.

Recently appointed to the London office of Brook Motors Ltd. as a sales engineer is **Mr G. D. Kelly,** who has been with the company for four years and was previously in the Production Planning Dept. at the Huddersfield Wks. He had a short period of training at the Huddersfield sales office before coming to London.

Mr Barry Rogel, B.SC.(ENG.), A.M.I.E.E., has left the Wayne Kerr Laboratories Ltd., to take up an appointment as managing director of the newly formed

* *Denotes revision to the "Electricity Supply Handbook, 1960."*

subsidiary of the Rosemount Engineering Co., Minneapolis, USA. He led the Wayne Kerr Microwave design team and in recent years has made a special study of the measurement of semi-conductor parameters to extend the use of transformer bridges. In September he lectured on this subject to the Fifth International Instruments and Measurements Conference in Stockholm. Mr Rogel will continue to act as consultant to Wayne Kerr.

The Minister of Power has appointed **Mr M. P. Murray,** C.B., to be a deputy secretary in the Ministry in succession to **Sir Reginald Ayres,** K.B.E., C.B., who, is retiring on 2 Jan. next. Mr Murray entered the Civil Service in 1929 as an assistant principal in the Air Ministry, where he was promoted to assistant secretary in 1940. In 1946 he transferred to the Ministry of Fuel and Power and in the following year was appointed Under Secretary in charge of the Electricity Division. Since 1959 he has been Director of Establishments in the Ministry. On the retirement of Sir Reginald Ayres, Mr Murray will be responsible for the Divisions in the Ministry dealing with electricity, gas, iron and steel, and safety and health in mines and quarries. **Mr M. Flett** will be the deputy secretary and will be responsible for those dealing with coal, petroleum and economics and statistics.

The new president and chairman of the Electrical Trades' Commercial Travellers' Association—installed at the annual general meeting last Friday—are both with AEI-Hotpoint. The president is **Mr J. D. Lake,** who was a sales executive with Pascalls Ltd. until joining the AEI-Hotpoint Co. in June, 1959, as general sales manager, and was appointed sales director last January. The new chairman is **Mr D. N. Hyde,** who started with Hotpoint back in 1934 in the Service Department and was subsequently in the Water Heating Department until 1939. After war service he rejoined Hotpoint for six months and then spent five years on the sales force of an electrical wholesaler, but he rejoined Hotpoint in 1952 as a sales representative. In 1959 he was taken off the "road" and transferred to head office and now controls the wholesale force of the company.

Head of the Electrical Measurements Section of the North Eastern Division of the CEGB for the past ten years, **Mr G. E. Moore,** M.I.E.E., retired on 30 Nov. after 40 years' service in the north east coast electricity supply industry (*ESH, page 70). A frequent contributor to our pages over a long period on matters relating to electricity measuring, Mr Moore is also the author of two IEE papers on the subject. He gained earlier experience with the Cambridge Instrument Co. Ltd. and was with the Newcastle upon Tyne Electricity Supply Co. from 1921 to 1929, after which he was meter and test superintendent with the Sunderland Corporation. Mr Moore was president of the EPEA in 1945, chairman of the Radio and Measurements Group of the IEE North Eastern Centre in 1949-50, and has served on BSI committees. To mark his retirement a dinner was given in his honour last Monday.

Mr W. E. Hind has been appointed manager (home sales) of British Insulated Callender's Cables. His responsibilities cover all aspects of the company's selling activities in the home market. He was previously deputy manager (home sales).

Sir James R. H. Hutchison, BT., D.S.O., T.D., J.P., has been appointed a director and chairman of Glenfield and Kennedy Holdings Ltd. in succession to the late Mr H. Cowan-Douglas. **Mr J. D. Latta,** M.C., has also been appointed a director.

Mr H. Howarth, Mr L. Stanworth and **Mr F. M. Ward** have joined the board of Burco-Dean Ltd.

Surprise! Surprise!! **Mr T. Coates,** M.ENG., M.I.E.E., M.I.MECH.E., who has been deputy chairman of the North Western Electricity Board from Jan., 1956, has been appointed general manager of the British Egg Marketing Board. Aged 53, he will be the three-year-old Board's first general manager, at a salary of over £5,000 p.a. we understand. Apart from war service—in the Royal Navy (Air Branch)—Mr Coates has served in the Electricity Supply Industry throughout his career. Educated at Ormdle and Liverpool University, he started as a college apprentice with Metropolitan-Vickers. In 1934 he joined the Liverpool Corporation undertaking, subsequently holding successive appointments, and ultimately as deputy city electrical engineer from 1945. From 1948 to 1955 he was manager of Manweb's No. 3 sub-area. He was also chairman of the IEE Mersey and North Wales Centre in 1953-54. His many friends will join us in wishing him all success in his new sphere, where he starts on 2 Jan.

Mr J. D. Lake

Mr D. N. Hyde

Mr T. Coates

OBITUARY

Mr H. Peart, representative of Belling and Co. Ltd. on the north east coast, died on 15 Nov.

Mr Harry Moss, M.I.E.E., F.I.E.S., a former well-known electrical contractor in Bradford, died on 20 Nov., aged 81. He retired in June, 1940, from the business which he started before the first world war. He had been a member of the Executive Committee of the Bradford branch of the Electrical Contractors' Association for 27 years, and also acted as hon. secretary of that branch for a long time; and was chairman for eight years. For about ten years he was a member of the National Council of the ECA and its allied associations. A great protagonist of the electrical way of life, while stressing the need for care, he was associated with several early electrical plans before starting up in business on his own account. As manager for the firm responsible, he designed and installed the hydro-electric plant at Grassington, which was opened in October, 1908. This had one 30 b.h.p. vertical shaft turbine operating on an 8 ft head, utilising the waters of the River Wharfe above Linton Falls. He installed electric lighting in several Baildon houses years before a public supply became available and introduced electricity to Eccleshill by persuading the authorities to run the first overhead cables in Bradford. He also claimed to be the first contractor in the country to introduce an easy-payment scheme for electrical installations. His death will be mourned by his many old friends in the contracting industry.

Mr T. L. Moffat, the Scots-born designer of the well-known cookers of that name, died in Toronto on 24 Nov., aged 98. He went out to Canada in 1867 with his father, who started to make ploughs, and Mr T. L. Moffat subsequently initiated the cooker business.

Mr G. H. Pearson, O.B.E., A.M.I.C.E., formerly assistant mechanical engineer to the Southern Railway, died on 25 Nov., aged 85.

Mr. E. H. Jesty, A.M.I.E.E., technical officer, Chief Engineer's Department of the London Electricity Board, died on 24 Nov., aged 59. Latterly he had been primarily engaged on liaison and budgetary work. He had spent a period in France under the interchange system during which he initiated a strong link with Electricité de France. Prior to 1948 he was deputy mains superintendent with the London Electricity Supply Corporation Ltd. and joined the LEB as technical officer (design and planning). Mr Jesty was also a frequent contributor to the ELECTRICAL TIMES, particularly on the early history of the electricity supply industry, of which he had made a close study, and in our Christmas issues of 1950 and 1951 he outlined some of the work of marauding companies which operated without statutory powers in London in the 1880's, and provided some interesting early records. He was a member of the Chief Technical Assistants' Association and the Engineers' Guild.

Testing modern instruments

SIMPLIFICATION of testing routine has formed the theme on which Nalder Bros and Thompson have reconstructed their instrument testing. The modernised test routine and equipment will aid the company to meet the quicker deliveries now required for their expanding instrument market by customers both at home and overseas.

It is now 20 years since Nalders were last reorganised completely. With the growth of business and increasing requests for shorter delivery, it was decided to redesign the test facilities on modern lines.

Test Rooms

The new test rooms have been developed over a period of three years and have recently been brought into service. The test-room temperature is thermostatically controlled and a high level of illumination ensures comfort for the employees.

The new rooms have 40 testing desks and these have been carefully planned to eliminate connection errors, at the same time ensuring that they are kept clear of wires. Supplies for testing each particular type of meter or relay are brought to specific desks from generating plant housed in a separate substation. To speed testing procedure, special cables have been installed in under-floor ducting. All tests circuits are made by twin or multiple core cables connected by plug and socket to the test benches and then to the standards or instruments to be calibrated.

Scope of Test Desks

The test desks cover six main testing requirements:

(1) Calibration and testing of all ordinary ammeters and voltmeters, both switchboard and portable types.

(2) Three-phase instrument calibration and testing.

(3) Frequency meter calibration and testing.

(4) Overload, directional and specialised relay testing and calibration. These desks employ a system of electronic contact amplification for testing.

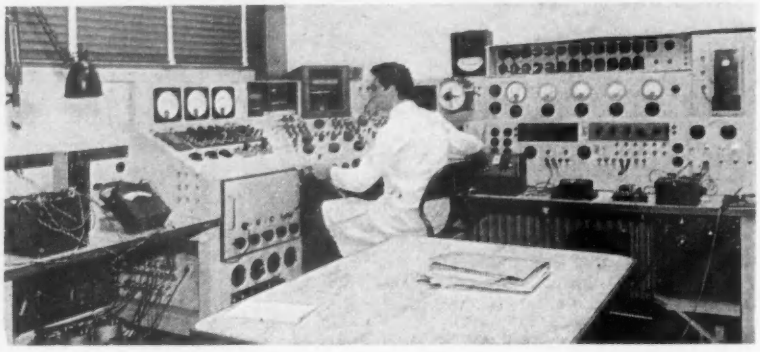
(5) A scaling department dealing with individual scaling and accurate printing of instrument scales following calibration.

(6) A substandards department for calibrating or testing all standard instruments built to special orders. Standard instruments used in other sections of the meter test are also checked on these benches.

In addition to these routine test facilities, the company has installed a thermostatically controlled and timed humidity cabinet for proving instruments destined for tropical use.

Testing Supplies

For high frequency and three-phase calibration and testing, power is obtained from motor-generator sets housed away from the test room and remotely controlled by push-button for both speed and power factor. One particular machine is thought to be unique. It consists of a motor coupled to four three-phase generators. The machines are, a voltage generator, a frequency doubler and a current generator combined with a frequency doubler. The machines provide an output ranging from 100 c/s to 800 c/s with complete phase angle control from zero lag to zero lead.



This section of the new Nalder Bros and Thompson test rooms is concerned with calibration and testing of substandard meters

Rationalising equipment production

CURRENTLY carrying out a programme of expansion, MTE Control Gear Ltd. is typical of smaller enterprising firms set up after the war. The company specialises in design and construction of motor control panels and cubicles, also manufacturing the necessary electromagnetic relays and contactors. A wide range of applications is catered for; from sewage-works pumping installations to air-conditioning plant and automatic machine-tool drives.

Simplicity, standardisation and interchangeability may be said to be key words in describing the design and production methods of the company. Resulting from difficulties experienced in obtaining layout draughtsmen, MTE introduced the use of pre-drilled and slotted support members in the assembly of control panels. This not only greatly reduces drawing office time, but gives flexibility of layout and simplifies assembly in the shop. The "modular" concept also extends to relay and contactor design, the emphasis being on unit construction with as many interchangeable components as possible. The number of replacement parts necessary has thus been cut down, making for easier maintenance.

In the design of certain other specialist control devices manufactured, the company have followed a policy of adaptation of simple but effective ideas. One of these, the "Discmag," is an electrically actuated brake for abruptly stopping machine-tool drives. This, in principle, is a spring-loaded disc friction-clutch with a fixed body. Held released while the motor is running by the series current of the motor, interruption of supply engages the brake, bringing the machine to an immediate standstill.

The firm have solved the problem of sequential switching of solenoid or similar loads with equipment the basis of which is a standard GPO pattern uni-selector. Normally a uni-selector stepping contact cannot make or break loads much above 12 W though they can safely carry a current of 1 A continuously. An obvious, but complex, arrangement to utilise the full current carrying capacity is to employ a number of subsidiary relays, each rated at 1 A breaking, with the coils energised by the uni-selector. In the MTE "Unicontrol" system, only one breaking relay is used, the coil of which is energised to break each time the uni-selector "steps." The contacts of this relay are inserted in the return line of the uni-selector wiper arm, effectively transferring the breaking function from the selector contacts to the relay. Connections to the load are made via plug sockets, the intention being to facilitate alterations to the switching sequence by simply changing-round plug leads from the load circuits. Application of such a system to process or machine-tool control considerably reduces the relay circuitry which would normally be required.

Future for appliance sales

ECONOMISTS PREDICT DEMAND TRENDS

PREDICTION of future sales trends for four major electrical appliances is attempted in an article published in the November issue of *National Institute Economic Review*.* The overall conclusion is that the fast rise in demand of the past decade must be regarded as left behind; that in the 1960's demand is not likely to rise faster than 2½ to 5% per year. The review alleges that manufacturers have been too optimistic about the future trend of demand, although in some instances the introduction of much cheaper appliances could alter the picture.

Examination of past sales figures shows that for the four appliances together, sales rose at a rate of 18%/year (on a basis of constant prices) from 1950 to 1955, and at 15%/year from 1955 to 1959. The prospect for 1959 to 1965 is of a rise of 2½ to 5% a year, with no acceleration likely in 1965 to 70. Output is likely to go up a little more slowly than sales.

Does this mean that consumers will spend increasing amounts on other electrical appliances in the home? The survey concludes that it does not. The four items reviewed account for over two-thirds of consumers' total purchases of radio and electrical goods.

Turning to individual appliances, the following predictions are made—and developed in more detail, of course, in the survey itself:

Washing machines. The upward trend will probably slow down by the mid-1960's. On optimistic assumptions, demand in 1965 could reach about 1·3 million, which is no higher than actual home supplies (as distinct from sales) in 1959. Capacity in the industry is put at 2 million machines/year.

Vacuum cleaners. Sales may rise to 1·4 to 1·7 million in the mid-sixties, and then level off and fall a little. This compares with 1959 home supplies of 1·5 million and capacity of over 2 million.

Refrigerators. Sales are estimated as just beginning to spread to a mass market. Ownership is rising rapidly. Yet sales may well not rise above the 1960 level, when probably over 1¼ million refrigerators will prove to have been sold, and about 7% of the households in the UK bought a new refrigerator. Replacement demand will be negligible for some years yet. The industry has capacity for about 2 million units a year.

Television sets. Increase in demand will begin to slow down, particularly after 1963 to 64. Yet prospects of rise in sales are adjudged as good as for any other of the appliances because of the relatively short life of TV sets, which will send up the replacement demand in the next few years. Demand in the mid-sixties is placed at about 3 to 3·3 million sets, the lower figure being about equal to present capacity. This assumes replacement after six years' use.

* *National Institute Economic Review* is published by the National Institute of Economic and Social Research from 2 Dean Trench Street, Smith Square, S.W.1. Single copies cost 8s 6d.

Causes of Demand Changes

The major part of the survey is devoted to consideration of the effects of various changes in circumstances on demand. Again, these may be discussed under a number of headings.

Income effects. It seems that if real incomes increase by 10%, and other factors remain unchanged, then demand for consumers' durables is likely to grow by between 15 and 30%. Because domestic appliances have on the whole high initial cost and low running cost, HP can be a major factor in accelerating increase of ownership.

Price effects. Prices in real terms are judged to have fallen since 1950. Relative retail prices of TV sets and refrigerators have fallen by a third, those of washing machines by a quarter, and those of vacuum cleaners by a fifth. Price movements such as these may have stimulated demand by 30 to 50%. There is probably some link between income and price effects.

Learning, saturation and replacement effects. Price and income effects do not explain away the whole of the rise in demand. There is a "learning" process. It takes time for consumers to find out about unfamiliar goods. Learning combines with income and price effects to adjust demand to an initial slow rise followed by a fast increase. Then saturation effects begin to come into play. Saturation effects are not necessarily tied to ownership of one only of the appliances concerned; but there may be a pause before there is any general move to ownership of more than one appliance. Thus saturation level is not something that can be fixed ahead for long periods of time. It is relevant in terms of saturation to remember that in the UK the number of households has been increasing; it has grown by over 20% since 1945.

Short Term Outlooks

Besides its long term look at prospects, the survey considers the years immediately ahead. For washing machines, it is reckoned that currently 37% of households own an appliance. Some sort of saturation level is predicted at 80% of households, on a basis of people living on their own and of those who prefer laundries. Saturation is likely to be reached in the early 1970's. Sales to new buyers are not expected to rise above 1959 levels, and they will very soon begin to fall. Replacement sales are only just beginning to be significant.

In true short term movements, changes in HP terms account for over two-thirds of total changes in sales. And removal of PT might bring a 20 to 50% increase in demand.

For vacuum cleaners, HP changes account for only about one-third of short-term changes. Abolition of PT might raise demand 15 to 30%. Recovery in output is predicted for 1961.

Refrigerators on analysis showed no clear relation between HP and sales. There is likely to be a bigger link here in the future, with more refrigerators being bought by working class owners.

Transformers in court

RESTRICTIVE PRACTICES CASE CONTINUES

WITNESSES called by the Transformer Manufacturers' Association are currently giving evidence before the Restrictive Practices Court and being cross-examined by counsel for the Registrar of Restrictive Trading Practices. When the case was resumed on Tuesday last week (for earlier reports see ELECTRICAL TIMES, 24 November), counsel for the Association continued his opening address on the question of the electricity supply industry. Previously, he had dealt broadly with general questions and had touched on the question of export. Export prices were the subject of an agreement amongst members of the Association separate from that applying to sales in the UK, he pointed out. However, the Association claimed that the working of the export agreement depended on the free communication of technical and other information amongst members. They would be unwilling to share such information if at a given time they were competing in prices in the home market. In consequence, abandonment of the home agreement would sooner or later lead to less of the export agreement.

On the question of supply industry purchases, it was said that electricity boards had made it clear to manufacturers that each expected the same terms. The Association did not complain of the boards co-operating on this question of price, as they did in matters of standardisation. Manufacturers had consented in 1952 to a cost investigation of large transformers, but this was postponed when a Monopolies Commission investigation was ordered. After the Monopolies Commission had reported, electricity authorities indicated that they would have nothing to do with a cost investigation, on the grounds that the Monopolies Commission had expressed disapproval of a common level of prices.

In 1958, there were discussions about prices for larger transformers to be produced in the future. The manufacturers had suggested that prices should be based on average of all manufacturers' costs for transformers above 50% in excess of the largest ratings manufactured. The electricity authorities had wanted costs based on the three lowest manufacturers' costings, for transformers 100% in excess of existing ratings. Subsequently, it was suggested by the electricity boards that future contracts should be on a cost plus basis as a temporary measure.

What it's all about . . .

The ten-member Transformer Manufacturers' Association is defending before the Restrictive Practices Court its agreement providing minimum prices for transformers sold for use in the UK. To succeed, it has to satisfy the Court that restrictions on trading in the agreement are not against the "public interest" as defined in the RTP Act. The Act sets out seven acceptable justifications of restrictions, and the Association is claiming to meet four of these. Briefly, these are: the agreement protects the public against injury in connection with the use of transformers; it brings substantial benefits to purchasers and users which would be lost if the agreement were abandoned; it is necessary to enable members of the Association to negotiate fair terms with powerful purchasers such as the CEGB and area boards; and its abandonment would harm export trade. The case began on Monday, 21 November, and will last several weeks.

Evidence

First witness of the Association was Mr R. M. Charley, a consultant with English Electric Company. He said that the basis of the Association's agreement was level price and level performance. As regards the EE Company, business in larger transformers had fallen away so badly that only 62% of the company's productive capacity was likely to be used, compared with 95% in 1959. They were budgeting for an even smaller capacity in 1961. Mr Charley emphasised that a considerable scale of research was necessary to meet demands of overseas markets, where transformers had to be supplied for higher voltages than were required in the UK.

Dealing with competition in export markets in recent years, he said it was very serious, and the amount of business a company was able to get in the export field was decreasing. The Association price agreement was a tremendous help in obtaining such business. Existence of the Association helped the manufacturers to meet the great variety of requirements by overseas customers. He said he had heard criticisms abroad of level-price tendering based on the assumption that such prices were necessarily at an unreasonably high level. However, the critics agreed that when they had a number of tenders at level prices, with other features reasonably level, they were able to use their engineering instinct to select the tender most suitable to them. When prices were different, with other features also differing widely, it was difficult to justify not placing the order with one of the lowest tenders.

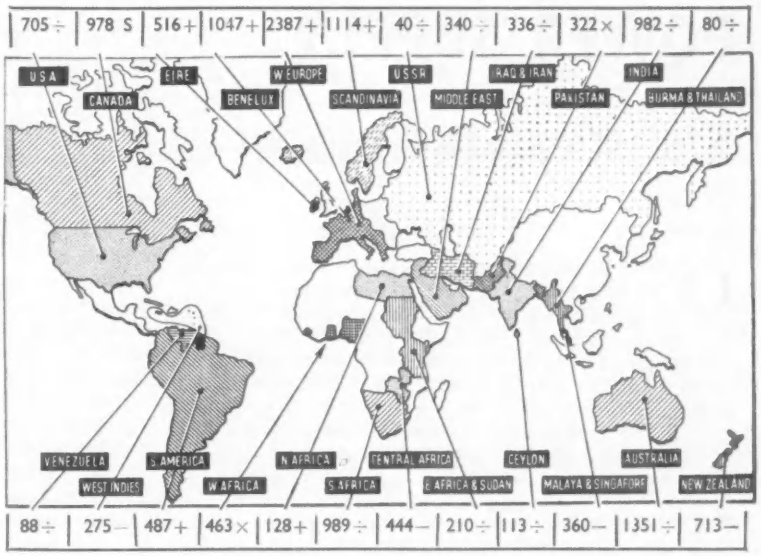
In cross-examination, Mr Charley agreed that the only feature of competition in the agreement was in quality. The Association had gone a long way in making the agreement favourable to the purchasers by taking an average of the three lowest cost producers. It was not the intention of the agreement to prevent a customer from having the benefit of the lowest cost producer. He felt that violent price cutting would be inevitable if the agreement were abandoned. Prices would drop to an alarming degree and some firms would be brought to the verge of bankruptcy. However, if some manufacturers stopped production the remaining capacity would accord more closely to the demand.

Mr Charley, who was in the witness box for four days, completed his evidence by explaining that competition overseas from local manufacturers applied mainly to small transformers, up to a few kVA in rating.

The next witness was Mr R. M. Hobill (general manager, Ferranti Ltd. transformer dept.), who confirmed that loss of the Association's home price agreement would make the export agreement ineffective. Continental competitors quoted "absurdly low prices" in foreign markets

Distribution of Exports in £'000's Sterling

×=over 25% increase
+=10% to 25% increase
S=10%+ to 10%−
−=10% to 25% decrease
÷=over 25% decrease
on previous year's figures.



EXPORTS IMPORTS

October

RECOVERING from the serious decline during September, exports of all types of electrical goods rose to over £22·3 million in value last month—about the monthly average for the year. The total for October, although the best since May (an improvement to some extent due to the ending of the tally-clerks strike in the Port of London), is very little different from that of the corresponding month of 1959. Compared with last year, the heavy plant side of the industry suffered a sharp reduction in exports, particularly in respect of transformers over 7,500 kVA, exports of which amounted to £367,831 last month, as against £1,093,622 a year ago. Even exports of radio and electronic equipment were over £500,000 down on the same month of 1959. But the appliance industry shows a more favourable scene with another steady increase in which washing machines made a notable contribution, although domestic refrigerators suffered a setback.

The decline in cable exports continues, all branches being affected.

Surveying the markets, by far the major improvement has occurred in Europe generally, and in Western Germany, Netherlands, Italy, Norway and Denmark in particular, but exports to the USA dropped sharply.

Turning to electrical goods imported, it will be noted that those for refrigerators have shrunk considerably, but total value of imports increased once again.

Description	Exports Value (£)		Imports Value (£)	
	Oct. 1959	Oct. 1960	Oct. 1959	Oct. 1960
Generators				
Diesel up to 200 kW	407,968	200,534		
Diesel over 200 kW	190,511	98,802		
Steam turbine driven	5,041	123,519		
Water and gas turbines	302,147	431,039	96,697	140,898
With i.c. and other prime movers	105,340	31,715		
Generators up to 200 kW	135,271	38,240		
Generators over 200 kW	63,206	60,121		
Generator parts	729,530	471,017		
Motors, f.h.p.	319,014	229,152		
Motors 1-250 h.p.	516,025	445,796	144,529	294,205
Other motors	368,297	313,563		
Motor starters and controllers	211,646	279,086		
Converters and rectifiers	132,747	154,641	132,059	100,854
Transformers	1,759,569	679,440		
Switchgear, to 200 A, mv	346,371	465,221	87,066	220,998
Switchgear, other	1,205,682	725,187		
Total, Electrical Plant	*6,798,365*	*4,747,073*	*460,351*	*756,955*
Batteries, primary and parts	608,331	523,716		
†Lamps filament, over 28 V	113,172	62,488		
Lamps filament, under 28 V	31,840	28,223		
Fluorescent and other lamps	101,965	84,850		
Radio and electronic gear	3,846,954	3,316,204	1,450,052	1,675,965
Telephone and telegraphic equipment	1,581,401	1,166,996		
Cookers	51,766	40,836		
Toasters	23,668	28,669		
Other cooking appliances and parts	150,673	116,927		
Space heaters	36,762	37,235	186,858	209,939
Water heaters	27,522	22,221		
Other heaters and parts	161,482	149,758		
Electric irons	91,011	76,500		
Vacuum cleaners	140,670	158,477		
Floor polishers	58,107	65,318		
Food mixers	81,365	64,199		
Washing machines, domestic	385,780	832,870		
Dryers		30,045		
Washing machine and dryer parts	86,218	177,724		
Domestic refrigerators and parts	718,796	553,730	182,780	110,547
Other appliances and parts	323,794	363,994		
Total, Domestic Appliances	*2,337,614*	*2,718,503*		
Portable power tools	266,229	183,128		
Arc welding plant	50,253	59,269	70,466	61,560
Resistance welding plant	25,890	10,689		
Electric furnaces	105,212	80,335		
Signalling apparatus	130,991	98,121		
Commercial instruments	165,661	147,489	227,411	293,406
House service meters	133,692	98,434		
Wiring accessories	221,097	146,155		
Fans	77,362	64,653		
Lighting fittings and lanterns	338,286	216,392		
Other lighting equipment	97,502	58,623		
Telephone and telegraph cable	336,809	198,437		
Paper insulated cables	417,166	381,457		
Rubber insulated cables	286,389	191,520		
Thermoplastic insulated cables	258,899	179,193		
Winding and similar wires	138,183	193,546		
Other cables and wires	205,676	147,818		
Total, all cables and wires	*1,643,122*	*1,291,971*		
Accumulators and parts	333,127	257,249		
Insulating materials	209,744	164,193		
Electrical ware	87,203	100,733		
Industrial electronic control gear	158,540	227,159		
Permanent magnets	58,983	56,198		
All other articles	2,800,558	2,335,847	1,536,162	1,940,358
Total	22,323,094	22,344,691	4,114,080	5,048,730

POWER SUPPLY

Statistics for October

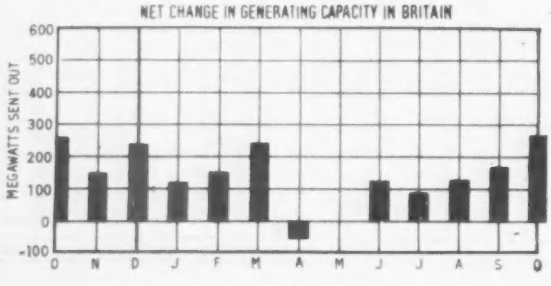
OUTPUT capacity of generating plant rose by 258 MW during October, principally as a result of commissionings by the CEGB shown in the table. The output capacity of the CEGB is now 26,295 MW and the total for the three boards has risen to 29,099 MW, or 6·1%, higher than in October, 1959. Although the set at Skelton Grange "B" is designated No. 11, it is actually the first set commissioned in the "B" station which will ultimately have four 120 MW turbo-alternators. Spondon "H" has back-pressure sets installed and supplies large quantities of process steam to a nearby chemical works.

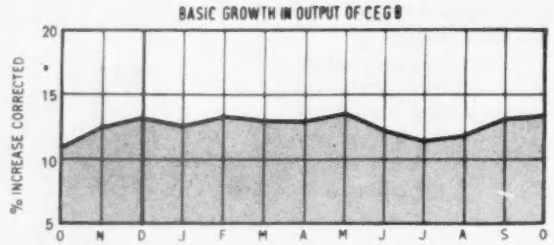
Electricity sent out by the CEGB rose during the month to 9,048 million kWh. For the NSHEB and SSEB the corresponding outputs were 190 million kWh and 596 million kWh, giving a total for the three boards 15·6% higher than in October, 1959. Referring to fuel consumption, there is a notable decline of 31% in the quantities of coke and breeze burnt and the consumption now amounts to only 1·9% of the coal consumption. On the other hand, coal consumption has risen by 17·2% over the same period last year, and oil consumption is also up by nearly 30% to 480,000 tons.

Electricity Board Sales Progress in October

Board	Electricity sent out in millions of units	% increase in Oct. 1959
London	788·7	20·1
South Eastern	547·5	14·7
Southern	727·1	17·1
South Western	337·2	18·2
Eastern	882·8	18·1
East Midlands	746·4	17·6
Midlands	985·1	16·9
South Wales	528·6	7·9
Merseyside and N. Wales	573·4	14·7
Yorkshire	980·4	19·0
North Eastern	548·8	16·6
North Western...	947·1	14·6
Direct Supplies by CEGB	314·8	1·0
CEGB Total	8,907·9	15·8
South of Scotland	699·6	15·4
North of Scotland	156·0	20·5

Table excludes area board purchases from other sources

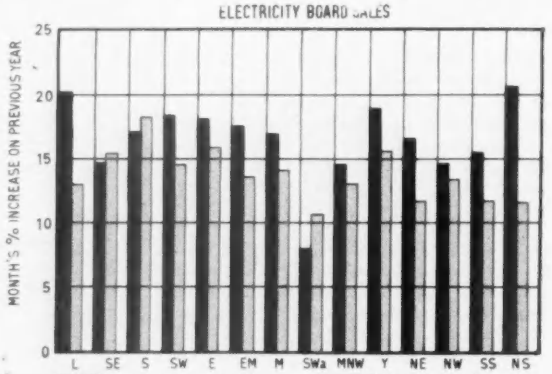


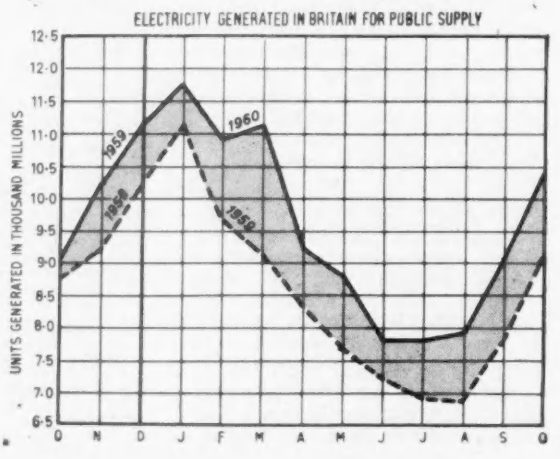


Sales by the area boards show a rise of 13·4% over October last year when the usual corrections have been made for average temperature and number of working days. Before these corrections are made, the increase in sales amounts to 15·6% and, although London and Yorkshire have raised their sales by about 20%, the rise is more evenly distributed among the area boards than last month. Records of sales over the past 12 months show that the Southern Board has the largest increase at 16·2%, but the Yorkshire Board lags only slightly at 16%.

New plant commissioned in October

Station	Plant No.	Alternator MW rating and maker	Boiler klb/hr rating and maker
Aberthaw (SWa)	2	100 C. A. Parsons	755 Foster Wheeler
High Marnham (EM)	2	200 English Electric	1,400 Int. Combustion
Skelton Grange "B" (Y)	11	120 C. A. Parsons	860 Mitchell
Spondon "H" (EM)	26		180 Foster Wheeler





Providing for partitions

NEW ZEALAND INSTALLATION DESIGN

A FEATURE that is coming into greater prominence in the design of the office accommodation type of building is partitioning which can be shifted or altered to comply with changing requirements. The type of partition used can vary considerably. This is a case where co-operation between architect and electrical engineer is essential to ensure that electrical and telephone services are provided for in the design.

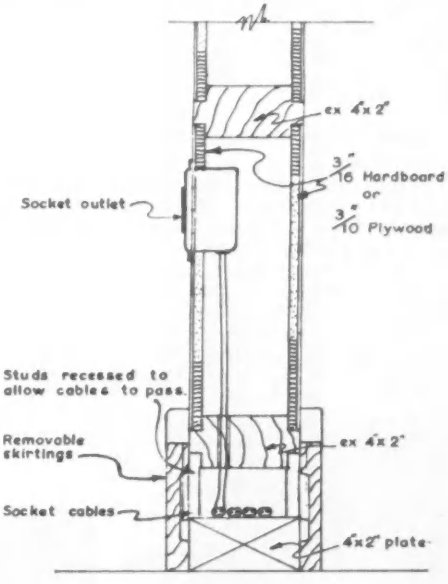
Under construction at present in Wellington, New Zealand, is an 11-storey departmental building, with a total floor area of 227,000 sq ft. Like most State projects it was designed and is being supervised by the Ministry of Works. The building is of reinforced concrete, with false removable ceiling panels suspended below beam level on each floor. Heating is provided by hot water convectors spaced around the periphery of the building under window-sill level, the pipes and finned heating elements being enclosed in continuous runs of sheet metal casings. Advantage has been taken of these runs to incorporate, in the base, wiring ducts for power and telephone cabling.

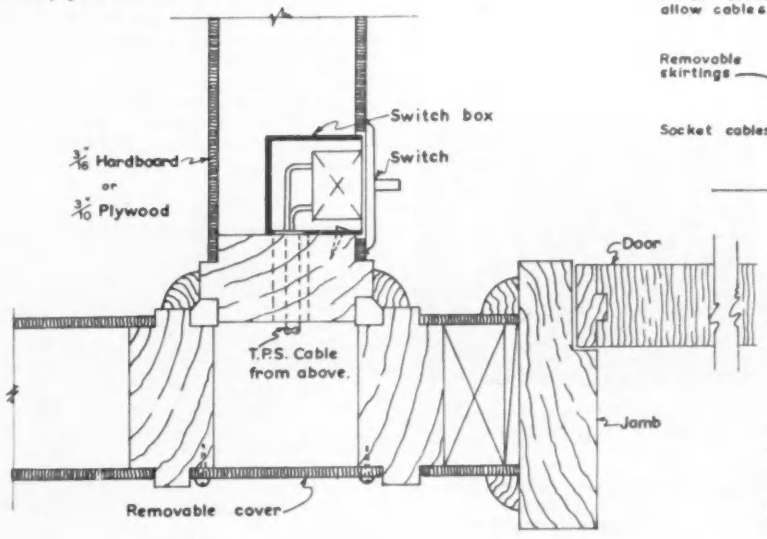
The basic wiring for lighting is run in t.p.s. cabling in the false ceiling space, circuits being first taken to junction boxes and thence to particular room circuits as partitioning below requires. Wiring for socket-outlets is first taken into the ceiling space and then up into the ducts in the convector bases above, using conduits to pass through the slab. In addition, provision has been made for outlets which may be required away from partitions by casting 2 in. by 2 in. wooden plugs into the floor slabs at regular spacings. These can be drilled and outlets wired from the ceiling space below.

The demountable partitions are designed to butt up against the ceilings and to the convector enclosures, and by this means light switch wiring can be led down to switch positions, and extra socket or telephone outlets can be wired across from the ducts in the convector bases.

The partitions are prefabricated in several standard panel widths and in various types to allow for doorways, louvres, junctions, etc., so by choosing the appropriate panel type a wide variety of partitioning can be arranged. The sections are built up on 4 in. by 2 in. rebated studs with adjacent sections bolted with 3 in. wide metal clips. This 3 in. space provides a vertical wiring duct which is covered by a removable panel. In practice the carpenters in the prefabricating shop mount the flush switch boxes and drill the studs and framework as required.

* This article is published through the courtesy of the Commissioner of Works, New Zealand Ministry of Works. The system described was mentioned in the Ministry's annual report for 1959-60 as having been developed to suit partitions in any position.





Above: Section of partition at floor level, showing how socket-outlets are wired from duct formed in base of partitioning. Wiring comes up through floor slab to the duct at the base of the partition, main lateral runs being in the false ceiling of the floor below

Left: Plan view of junction of partitions, showing how 3 in. space between two partitions is used as cable duct to bring cable down from false ceiling space to light switches. Studs holding partition facings are drilled before erection to provide path for cables

equipment for industry

Load at a glance

THE problem of measuring industrial mechanical loads, with or without recording facilities, is a diverse one. "Elcontrol" electronic equipment offers one solution of wide adaptation in the industrial field whether the load is in tension or compression. The basic unit, transducer or "load cell," comprises a small container housing a cylindrical high-tensile billet, drilled through the centre and with a number of fine wire strain gauges secured to it. These units can be placed under the feet of the machine, tank, rail truck or hopper or as part of a tensioning device, and the minute variations in length are converted by the gauges to electric signals indicated or recorded on a bridge-type instrument balanced for no-load conditions. The signals can also be used to operate an alarm or trip circuit in the event of overload beyond a prescribed level. *Elcontrol Ltd., Wilbury Way, Hitchin, Herts.*

Compact emergency supplies

IMPROVEMENTS in volume/output ratio of accumulator cells has extended their application to self-contained emergency lighting supply units for buildings. Equipment available consists of "Chloride High Efficiency" cells in conjunction with a battery charger housed in a sheet-steel cabinet. There are three sizes of cabinet, the largest having dimensions 4 ft 8 in. high by 3 ft 5 in. wide by 1 ft 6½ in. deep. Up to 26 cells are used to give voltages of 12 V, 24 V and 50 V, with a maximum capacity of 60 Ah for a 10 hr discharge. The charging unit incorporates a selenium bridge rectifier and 200 V to 250 V input mains transformer, and there are facilities for either rapid or trickle charging via rheostats. Failure of mains supply actuates a mercury switch which connects the battery to the emergency lighting circuit. Similar equipment, but intended for operating theatre lighting, allows for both interruption of mains supply as well as failure of lamp filaments. Emergency lighting is switched on, in this case, by an external relay connected in series with the main theatre lighting circuit. *Chloride Batteries Ltd., Exide Wks, Clifton Junction, Swinton, Manchester.*

High-efficiency bulkhead light

SOMEWHAT unusual is the application of fluorescent lamps to bulkhead lighting. A fitting currently available employs two 6 in. 4 W lamp units, connected in either series or parallel, and having a combined light output said to be equivalent to that of a 60 W tungsten filament lamp. It has a normal pattern cast-iron body with a hinged cover, glass dome and rubber waterproofing gasket. Basic cost is £6 19s 6d, alternative "Perspex" dome and heavy galvanised finish extra. The same firm makes a range of portable bench lights with flexible mounting stems, making use of 6 in. to 21 in. single or twin fluorescent tubes. These fittings are ideal for the illumination of drawing-board and other close work. *Weylite Ltd., Orchard La, Alton, Hants.*

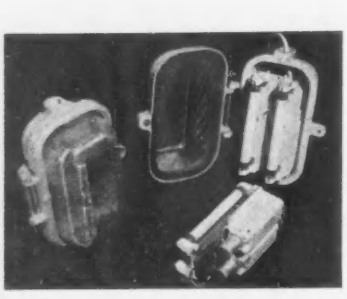
Plating thickness measurement

THICKNESS of industrial protective coatings, plating in particular, is of some importance in defining anti-corrosion properties. Several types of instrument are available to cover thickness measurement of a wide range of coatings. The "Kocour" thickness tester uses a coulometric method for measurement to an accuracy claimed to be ±5% for a thickness range between 0·000004 in. and 0·0015 in. A sample area of plating is immersed in a standard stripping solution and the cell so formed connected in series with a special integrating meter which gives readings proportioned to electrolytic current density multiplied by time. When stripping is completed, plating thickness can be estimated from the number of coulombs passed. A second instrument, the "BNF" gauge, is designed specifically for nickel plating on steel, but can also be used for nickel-plated brass. Its principle of operation is based on the thermo-electric effect of the junction of dissimilar metals and measurements are made with a test probe used in conjunction with a meter. Although less accurate than the first instrument, it has the comparative advantages that readings can be taken rapidly and by a non-destructive method. Two further instruments available can be used for thickness determination of non-metallic coatings; one, for coatings on magnetic materials, the other, suitable for anodic coatings, making use of eddy-current interference effect. *Nash and Thompson Ltd., Hook Rise, Tolworth, Surrey.*

An adjustable work-light

FINGER-TIP precision adjustment to any position within its radius of action is claimed for a spring-counter-balanced type incandescent lamp support. This also provides for the lampshade fitting itself to be directed at all required angles. Several models are available, having either two or three articulated steel arms, with a choice of arm length. The aluminium lampshade, together with the support, is supplied stove-enamelled in any of six colours. The support can be fitted either with a portable desk-top base or one of five brackets for various permanent mounting situations. Of Norwegian origin, it is said to be competitively priced. *The 1001 Lamp Co. Ltd., 66 Tyrwhitt Rd, S.E.4.*

◀ *Compact emergency lighting supply unit uses up to 26 Chloride accumulators with maximum rating of 60 Ah*



▲ *Weylite high-efficiency bulkhead fitting employs two 6 in., 4W fluorescent units*

Spring counter-balanced work-light allows precision adjustment to any position ▶

for the electrical trade

"Spit" pie-baking

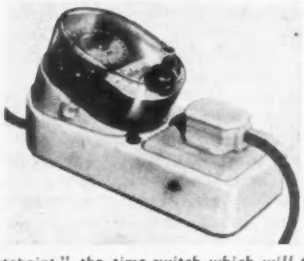
A PIE-BAKER built on much the same lines as the popular "Rotiss-O-Mat" barbecue and coming from the same source is being introduced. It is to be known as "Bake-O-Mat." Similar in appearance to the barbecue, it accommodates as many as 70 3 in. pies in trays suspended from a rotating spit. Cooking is by a 6·1 kW infra-red element. The fibreglass-insulated cabinet measures 43¼ in. high by 32 in. wide by 25½ in. deep. A 1 kW warming oven of similar dimensions, which also acts as a stand for the pie-baker, is available with it at a total price of £460. "Bake-O-Mat" alone is priced £350, and the warmer, £143. Delivery from stock. *Bake-O-Mat Ltd., 67 Jermyn St, W.1.*

Big reduction in date clock price

A REDUCTION of over £17 in the retail price of an electric calendar clock is announced. The clock now sells at £23 8s 3d instead of £41 2s 6d. It comprises an ordinary clock-face on a freestanding walnut panel with a day/date/month indicator below it. The calendar adjusts itself for leap years automatically. *Hadley Telephone and Sound Systems, Smethwick, Staffs.*

Time-switch for all appliances

A PORTABLE time-switch for domestic appliances is announced which will turn any electrical equipment on at any time and off after a pre-selected period. The switch, known as "Autopoint," comprises a 24 hr dial and a 13 amp three-pin socket-outlet, mounted in a white plastics base. A transparent removable shield covers the dial. "Autopoint" is simply plugged into a socket and the appliance to be switched on plugged into the built-in outlet. Two pre-selected "on" periods can be set for every 24 hr, they may be of any duration down to a minimum of 30 mins and will operate regularly without daily resetting. Applications of the time-switch are numerous. It can operate an electric blanket, switch on a radio or heater and even defrost a refrigerator. A pilot light indicates "on" periods. It stands on rubber feet and is supplied with 1½ yd of mains lead. Price £5 17s 6d retail. Dimensions are: 9¾ in. long by 4 in. wide and 5¼ in. high. *Venner Ltd., Kingston By-pass, New Malden, Surrey.*



"Autopoint," the time-switch which will turn any domestic electrical appliance on and off twice in each 24 hours at times set on the dial. £5 17s 6d

New numbers for Pakamatic

PAKAMAC inform us that their two refrigerators have been allocated new identification numbers. The 4 cu ft (350) is now known as "Pakamatic" 400 and the 2·8 cu ft (250) as "Pakamatic" 280. *Pakamac Special Products, Melbourne Mill, Chadderton, Lancs.*

Cooking without cramping

COOKING appliances for bed-sitting-rooms or smaller flats form a field of increasing importance, calling for compact yet versatile design. An example of a unit which meets this challenge with marked success is the Rönsch "Clear-View" table stove. This cooker, a German import, will stew, roast or bake many items which would normally be allotted to a grill or oven. It comprises a circular heated plate covered by a heat-resistant glass cover which embodies a further heating element at its top. This unit should have a special appeal since the general trend in full-scale cookers favours a transparent oven door.

The heating elements both have a loading of 400 W and are operated separately from a single four-position switch. Selling price is £10 10s, and that includes drip pan, grill, wire dish support and heat-proof glass dish as well as lead and plug.

Another useful item which might well make a companion piece to the table stove is a boiling ring, selling at only £4. The spiral three-heat element is mounted on a square casing, 5 in. high, finished in cream, white or blue baked enamel with chrome trimmings. It has black handles at each side. The element, of the black-heat type, has up to 1,200 W rating. There is a double-plate version of this unit available at £8 5s, which has a white cover and pilot light.

These appliances are being marketed under the trade name "Keylock" and all replacement spares are available from the distributors. *Armorduct Trading Co., 1-3 Brixton Rd, S.W.9.*

Left: The "Keylock" transparent table oven has elements in base and lid. £10 10s

Wash-spin combination

AS a result of their takeover of W. and S. Summerscales, Goblin have added a tandem washer-spin dryer to their range of appliances. Known as "Double G," it is identical in appearance to Summerscales' "Doublespin," but though its spin dryer now has a separate motor and pump, it sells at only slightly more. Washing and drying functions of this two-tub combination are independent and the spin dryer side of the unit is used for rinsing. The washer operates on the agitator principle and employs a 3 kW heater.

Two simple controls and a pilot light are placed in a recessed panel on the front fascia. This model has an outer casing of "Stelvetite" plastics-coated steel, which gives it a highly durable decorative finish. Dimensions are 31 in. high by 33 in. wide by 18½ in. deep. "Double G" sells at £76 16s tax paid. Laminated table top is £3 3s extra. *Goblin (BVC), Goblin Wks, Leatherhead, Surrey.*

Higher loading for water heater

THE "Stelvetite" cased thermal storage water heater, "Lincoln," is now available with 3 kW loading. It was originally available at 2 kW only. "Lincoln," which is finished in white or cream with red or blue trimming, has a 2·6 gallon capacity and sells at £12 12s 11d, tax paid. *Santon Ltd., Newport, Mon.*

Above: The £4 cooking ring for the bed-sitter. It has 1,200 W loading

Multi-way socket-outlet

A SOCKET-OUTLET for use on an extension lead, which accommodates four 13 amp plugs in a single housing, is now available under the "Briticent" label. A four-way 5 amp outlet has been available for some time. For use in workshops, laboratories and commercial establishments, the new outlet eliminates the necessity for long leads on all portable equipment. It has a square face, 5 in. by 5 in. with a three-pin socket in each corner, the supply lead entering through the side. Provision is made for wall mounting or suspension. Each outlet is shuttered and a 13 amp fuse is provided. All contacts are formed from continuous brass strip mounted edgewise "ring-main" fashion, and embedded in rubber or neoprene. Incoming mains are protected against direct strain by being looped around an insulated post in the centre of the unit. All screws within the housing are captive. Net trade price: £3 5s, neoprene; £2 15s, rubber. *British Central Electrical, Briticent Hse, 6-8 Rosebery Ave, E.C.1.*

The "Briticent" four-way outlet is fused and shuttered

Domestic heat pump

THE Jonmil heat pump, which was mentioned in ELECTRICAL TIMES, 13 Oct., News of the Week, in connection with a show house, is soon to be available through electrical contractors. The pump can provide refrigeration, central and water heating, the hot end having an output of about 12,000 thermal units. Prices, including installation costs, are: Mark I central heating and refrigeration unit, about £220; Mark II central heating, refrigeration and water heating unit, about £250. Though intended primarily for installation in new houses the pump will be available for installation in existing houses early in the new year. A same-day maintenance service is to be provided. *Jonmil Building Development Ltd., 16 Carlisle St, W.1.*

Wall-mounted heater

THE "Capella" suite is a framed, wall-mounted heater designed to take the place of a fireplace. The 2 kW bar- or rod-type fire is set in a broad rectangular golden mesh, with a final sturdy frame of wood projecting 5 in. from the wall. A diffused light is shed on to a rear panel from behind the fire's casing, providing a decorative illumination even when the fire is switched off. This arrangement, one which has become increasingly popular recently, seems to be a favourite substitute for the hearth which is fast disappearing from modern homes.

"Capella" is noteworthy for its low price. The suite is sold complete for £15 13s 6d tax paid. The rod-type fire version has chromium reflectors and is slightly more expensive at £16 18s 3d. Dimensions: 26 in. high, 38¼ in. wide and 5 in. deep. *Carron Co., Carron, Falkirk, Stirlingshire.*

TRADE PUBLICATIONS

POULTRY AIDS.—Pamphlet describing electronic poultry controls for brooders and electronic lighting and ventilation controls for broilers. Electronic Poultry Aids, Kimpton, Hitchin, Herts.

E.M.O.—Plastic slide-chart giving quick reference data on R series bearings; deep groove, light inch, low torque. E.M.O. Instrumentation, Western Rd, Bracknell, Berks.

I.C.I.—12-page booklet, "Silicones—Properties and Products." Imperial Chemical Industries, Nobel Division, Stevenson, Ayrshire, Scotland.

METWAY.—56-page illustrated catalogue and price-list of replacement elements. Metway Electrical Industries, Metway Wks, Canning St, Kemp Town, Brighton 7.

PETBOW.—Technical leaflet describing an arc welding generator. Petbow, Sandwich.

HOLOPHANE.—Technical leaflet describing bi-way bowl refractors, 2/4135 and 2/4140F, for use with fluorescent bulb, mercury discharge and tungsten lamps. Holophane Ltd., Elverton St, S.W.1.

WARD.—32-page illustrated catalogue entitled "Rails and Rail Accessories"—railway track materials, crossings and turnouts, lever boxes, buffers, etc. Thos. W. Ward, Albion Wks, Sheffield.

DAWE.—French catalogue of stroboscopic equipment. Dawe Instruments Ltd., 99-101 Uxbridge Rd, Ealing, W.5.

ATOMEX.—Leaflet entitled "Atomex Immersion Gold Solution" describing process of applying coating of gold to nickel, etc., for use in printed circuitry. Englehard Industries, Baker Platinum Division, 52 High Holborn, W.C.1.

GRIFFIN.—53-page illustrated catalogue of volumentric and lampblown glassware. Griffin and George Ltd., Ealing Rd, Alperton, Wembley.

D. AND T.—57-page comprehensive price-list of precision fasteners turned from the bar, i.e., cut thread screws, nuts, bolts, washers. Davis and Timmins, Billet Rd, Walthamstow, E.17.

FALKS.—56-page catalogue of industrial lighting fittings, Catalogue No. 819/60, and a brochure entitled "Falks Lighting Service" which describes large-scale lighting schemes for public buildings and commercial premises. Falk, Stadelmann and Co., 91 Farringdon Rd, E.C.1.

TROIDAC.—Set of technical leaflets giving details of voltage regulators. No. 25, resin cast; No. 10, resin cast; No. 20, air cooled and No. 40, air cooled. Foster Transformers, South Wimbledon, S.W.19.

ACCESS.—Set of leaflets on equipment for overhead work, including Tallescope aluminium telescopic work platform, Giraffe and Beanstalk hydraulic working platforms, Wall Spider, Mountie safety steps, Zip-up staging. Access Equipment, Maylands Ave, Hemel Hempstead, Herts.

BRITISH STANDARDS

Galvanised Mild Steel Wire for Armouring Cables. *BS 1442 : 1960.* This is a revision of the original specification published in 1948. In the original, resistivity of the wire was stated as an ohm/mile constant but it was not a specific requirement. Since the use of non-metallic sheathed cables is on the increase, when the resistance of the armour becomes more important, it has been considered more suitable for the maximum values to be expressed in ohms/1,000 yd at 20°C for each size of wire and to make the maximum values mandatory. That is the main change in the new standard. Wire for armouring submarine cables will be covered, as previously, by BS 1441.

Fixed Wire Wound Resistors for use in Telecommunication and Allied Electronic Equipment. *BS 2111 : Pt. 1 : 1960. Price 10s.* This is the first of two parts in a series dealing with components for use in telecommunication and electronic equipment and concerns fixed wire wound resistors. Part 1, now available, covers general requirements and tests; the second part, to be published shortly, will list standard sizes and ratings. The standard follows the usual pattern and applies to insulated and non-insulated fixed wire wound resistors up to 200,000 ohms with a dissipation of not more than 200 W at 70°C.

Non-reversible Connectors and Appliance Inlets for Portable Electric Appliances. *BS 3283 : 1960.* A new standard, separate and distinct from BS 562, for connectors and shrouded pin sockets, or appliance inlets, on domestic electrical appliances but with shrouded earthing contacts. It is intended that BS 3283 will eventually supersede BS 562 but, since so many appliances with the earlier design are in use, the older standard will remain in force for an indefinite period. BS 1671:1951, "Domestic Electric Kettles," is being amended to specify the use of the new connector which is nominally rated at 13 A, 250 V and is, of course, non-reversible.

Dimensions of 3-phase Electric Motors. Pt. 1: With Ventilated Enclosures. *BS 2960 : Pt. 1 : 1960. Price 6s.* This is an amendment to the 1958 standard with a number of alterations, the most important of which is the inclusion of maximum overall dimensions for foot-mounted motors as Appendix C, left blank in the 1958 issue, the inclusion of a table of effective lengths of keyways and a renumbering of tables and clauses. The purpose of the amendment is to rationalise the 1958 standard in order to bring a revised BS 2083 in as a second part. When this is released, both the revised and old standards will remain in force for a transitional period before BS 2083 is withdrawn. The amendment will be issued free of charge to all holders of BS 2960:1958 and will be included with copies ordered in future.

Copies of the above standards may be obtained from the British Standards Institution, Sales Branch, 2 Park St, W.1.

News of the Week

G.E.C. cut cooker, 'fridge prices

Rebate on traders' present stocks

THIS week's bombshell for the appliance market is a sharp drop in the retail prices of all General Electric Co.'s cookers and refrigerators. But no price reductions for other domestic equipment are envisaged by the group, a GEC spokesman told the ELECTRICAL TIMES yesterday. GEC is not the first firm to cut refrigerator prices, but now this major producer is setting a stiff pace in the cooker field also. Price of the "Quality" cooker has been reduced from £39 8s to £35, the "Superb" from £65 to £59 10s and, significantly, the "Estate," which is sold in bulk to housing authorities and such on a narrow profit margin, from £28 to £26. Cuts on refrigerators range from £12 10s on the 8 cu ft model, now £112 10s, to £3 4s 6d on the 2½ cu ft model, bringing it down to £45 3s. Retailers will be relieved to know that GEC have decided to reimburse them with the whole of the difference in factory price on their present stocks, though traders still forfeit the difference in purchase tax. In return, GEC expect retailers to maintain the new retail prices.

Although simultaneous, the cuts in cookers and refrigerator prices are being made for widely different reasons. Cooker sales generally were already rising, and GEC decided to give added impetus to this trend in order to maintain the high level of production at their Yorkshire works and so curb costs. GEC say their share of the cooker market is now almost 15% and looks like becoming larger than ever before. The move has nothing to do with the prospective merger with English Electric, and GEC is not lining up prices with EE, a GEC spokesman said. In the case of refrigerators, the market picture is by no means so rosy, and the price cut has been made to help clear some of the half million refrigerators of all makes at present drugging the home market. GEC say that until these stocks are reduced, new models cannot be introduced, with the result that Britain would fall behind in design and lose overseas markets.

Objections to Nevis Scheme

TWENTY-SIX societies and individuals have lodged objections to the proposed Glen Nevis hydro-electric scheme of the North of Scotland Hydro-Electric Board (to which we referred on 13 Oct). That number includes Inverness County Council, Fort William District Council and the British Aluminium Co., whose objections are understood to be legal formalities for the protection of possible interests. Main objector is the National Trust for Scotland, whose case is based on amenity and economic grounds. A public inquiry will probably be held.

LINE FROM WEST BURTON

A PROPOSED supergrid transmission line from West Burton, Notts, to Waltham Cross, Herts, is meeting opposition. The line would run by way of King's Lynn and Cambridge. The Lincolnshire branch of the Council for the Preservation of Rural England is against part of the route, and the Planning Committee of Kesteven County Council are objecting to the proposed route in Kesteven and ask for an alternative plan.

No Electrical Forum

EFFORTS to form an "Electrical Forum" to replace the Electrical Fair Trading Council when it is wound up at the end of this year appear to have failed. At a meeting called by Mr T. W. Heather on 21 Oct. (ELECTRICAL TIMES, *27 Oct.*), *trade organisations within the industry were asked to indicate their views on setting up an investigating committee to look into the possibility of such a forum in which matters of general interest to the electrical industry could be discussed informally. It appears that insufficient support has been forthcoming even for this preliminary step of forming an investigating committee.*

Kingston fuel probe

SCOTLAND YARD have been called in by the CEGB to make investigations into alleged frauds involving records of fuel deliveries to Kingston power station. According to reports, there are allegations that lorry loads of fuel had been driven into the station at one gate, weighed and booked in, and then driven out through another gate without being unloaded.

Engineering pay deadlock

A WAGE increase offer by the employers' side in the engineering industry was rejected by union representatives last week. The latter meet at York on 8 Dec. to decide on the next move. The unions had asked for a flat increase of £1 a week, but this was turned down by the Engineering and Allied Employers' National Federation, who first offered increases of 6s a week for skilled men, 5s 6d for semi-skilled, 5s for unskilled and 4s 6d for women employees.

When the union's refused these they were offered an additional 1s all round, but this, too, was rejected.

The last pay increase in the engineering industry took effect in October, 1958, but in March last the working week was reduced from 44 hr to 42 hr without loss of pay.

H.E. in N. Ireland

A HYDRO-ELECTRIC plant in the Mourne Mountains is a feasible means of generating electricity, investigations have disclosed. This news was given by Lord Glentoran, Minister of Commerce, last week, but he pointed out that until he had completed an examination of different possible schemes it would be unwise to assume that pumped-storage plant would form part of Ulster's next programme of development.

Mechanicals lose rating appeal

THE appeal by the Institution of Mechanical Engineers against the decision of the Court of Appeal that the Institution was not entitled to exemption from rating under the Scientific Societies Act 1843, in respect of its premises, was rejected in the House of Lords last week. This was a test case undertaken on behalf of the senior institutions to elucidate their position.

In the earlier appeal it was held that the I.Mech.E. was not instituted for purposes of science exclusively, and was not supported wholly or in part by voluntary contributions.

Giving judgment in the Lords, Viscount Simonds pointed out that in Clause 7 of the Institution's Charter the word "science" occurred once only, and then in the phrase "education in engineering science and practice." So far as "mechanical engineering" connected scientific work, it must involve art and practice also. On the second question—the object of the members in joining—he considered it strained credulity too far to claim that they paid their annual subscriptions in a spirit of altruism and without regard to the advances that they obtained from membership. He could not believe that a material benefit was not derived from use of initials indicating membership. Lord Radcliffe and Lord Reid concurred, the latter emphasising that members' subscriptions were not "voluntary contributions."

HOLME PIERREPONT STATION INQUIRY

THE proposed Holme Pierrepont power station is to have four 500 MW turbo-alternators, and the site could accommodate a second station of similar size, it was stated at the public inquiry at Radcliffe-on-Trent last week. Fourteen organisations and authorities opposed the scheme mainly on the grounds that it would be in the green belt and close to residential property and absorb good agricultural land. It was said that within a one-mile radius of the site there are 78,000 people. Mr D. Cowley, representing the West Bridgford and Bingham Councils, contended that West Bridgford would lose £2 million in rateable value if the station was built.

Outlining the proposals, Mr S. B. R. Cooke, Q.C., for the CEGB, said there would be two 650 ft chimneys and eight cooling towers 375 ft high. The site of 525 acres was sufficient to accommodate a second station of the same size, but that would need permission at a later date. The Board had already asked for consent of the Minister of Power to develop a site at West Burton (for a similar station), which had the approval of the local planning authority.

For the Board, Mr F. Faux, station planning and development engineer, pointed out that, technically, Holme Pierrpont had the combination of qualities which made it outstanding for electricity generation—nearby coal mines, ample water supply, good foundations and railway connections, and convenient to existing main transmission lines. The station was planned to be in commission in 1966. A second similar station would be required before 1970. Ash could be disposed of locally by the County Council or could be taken by rail to the Peterborough area, where it could be deposited for many years to come.

There would be eight miles of railway sidings at the station and at full operation there would be a coal store of 2,000,000 tons occupying 45 acres at a depth of 30 ft.

Questioned by Mr J. P. Brockbank, for Notts County Council, he said the CEGB would consider extending High Marnham some time in the future. The limit of cooling water which could be taken from the Trent had not yet been reached, but the River Board could see the limit ahead when the Holme Pierrepont station was completed. Later, Mr Brockbank also argued that, on the Board's figures of fuel for Holme Pierrepont and West Burton, they would require 12 million more tons of coal a year than was locally available, for the NCB had stated that the maximum amount they could make available in 1968 would be 24 million tons a year.

Subsequently, Mr F. R. Hunt, of Planning and Development branch, CEGB, explained that all the conclusions reached by the Board were based on Holme Pierrepont not using more than five million tons of coal a year in the first stage.

On Friday, Mr Hunt said a third Nottingham power station might be built on another site along the River Trent. This would probably be constructed before either of the second stations were built at Holme Pierrepont and West Burton, but its construction depended upon whether coal would be reasonably available.

The inquiry continued on Tuesday, at the Shire Hall, Nottingham. Owing to the outbreak of foot and mouth disease in the area, the three inspectors conducting the inquiry (Mr H. W. Grimmitt and Mr W. L. N. French, MoP, and Mr D. Senior, MoH) would be unable to inspect the site just now.

EXTENSIONS FOR JERSEY

THE Jersey Electricity Co. Ltd. is seeking to raise £1 million for development work including the purchase of new generating plant valued at about £150,000. The company is controlled by the State of Jersey, which already owns all the Ordinary share capital, and the island's Parliament is being asked to approve a recommendation of its Finance Committee that it should take up an additional 1,000,000 £1 Ordinary shares in the company.

The new generating plant is to be installed in 1962.

Microwave conference

RECENT advances in microwave measurement techniques will be discussed at a conference being organised by the Electronics and Communications Section of the IEE to take place in London from 6 to 8 Sept., 1961. Papers on related topics will be welcomed, and intending authors are invited to submit abstracts of up to 250 words by 15 Feb.

S.W. flood damage charge

FIRST-AID repairs to consumers' electrical installations damaged in recent West Country floods cost the South Western Electricity Board £1,650—but the Board has waived the charges. This was reported to the Devon Committee of the Electricity Consultative Council last week by Capt R. C. Wield, council secretary, who pointed out that some of the Board's men, even though their own homes were flooded, remained at work where their skill and knowledge were required. Many men displayed courage and ingenuity, and worked long hours in their devotion to duty.

OFFICIAL PUBLICATIONS

BS 1332. Guide to civil land aerodrome lighting. 12s 6d.

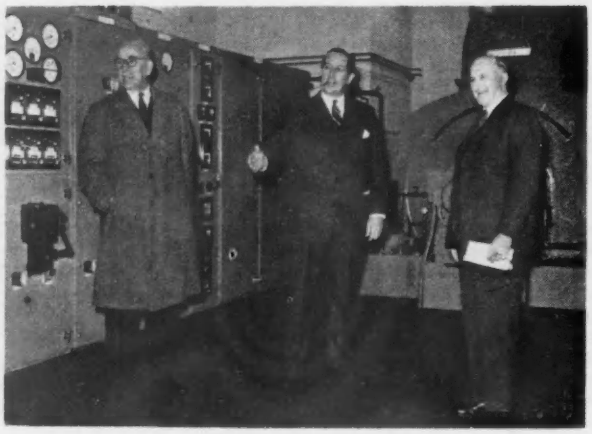
Mechanical and Electrical Engineering, including energy conversion, transmission and storage; atomic energy; pumping, blowing and compressing machinery; explosives and ordnance. Synopsis of historical events. Science Museum. HMSO. 3s.

Gas in Europe, 1960. Production, Availabilities, Consumption. OEEC Report. 12s 6d.

Import Duty Drawbacks (No. 13) Order, 1960. S.I. No. 2139 (see page 862).

Peak Sales in West

SWEB lifted sales by 12%, or 176 million units, in the first half of this financial year compared with the previous corresponding period, the chairman of SWEB, Mr A. N. Irens, said at the switch on this week of a £25,000 project improving supplies in the South Hams area. The project comprised replacement of old switchgear at the Kingsbridge substation, a new 11,000 V line to give Bigbury and Kingston a more direct supply from Kingsbridge, and a new alternate link for these areas from Modbury, making electricity available to 34 more rural properties at the same time.



At the inauguration of the 3 MW gas-turbine station at Lynton, Devon, to which we referred last week. Left to right, Sir Alec Coryton, deputy chairman, of Bristol Siddeley Engines Ltd., Mr A. N. Irens, chairman, S. Western EB, and Sir George Hayter-Hames, chairman, Devon C.C., at the switch-on ceremony. The machine's alternator was supplied by Electric Construction Co. Ltd. (not English Electric as we previously stated)

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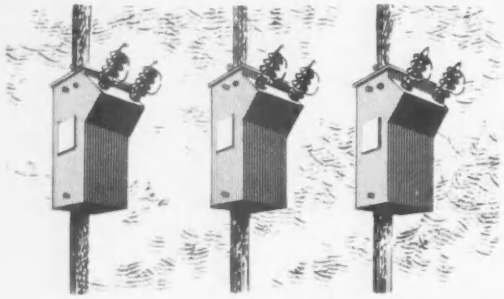
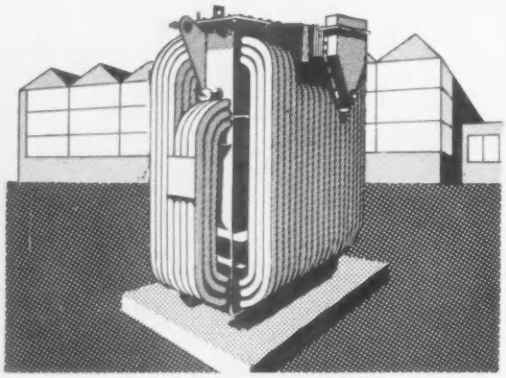
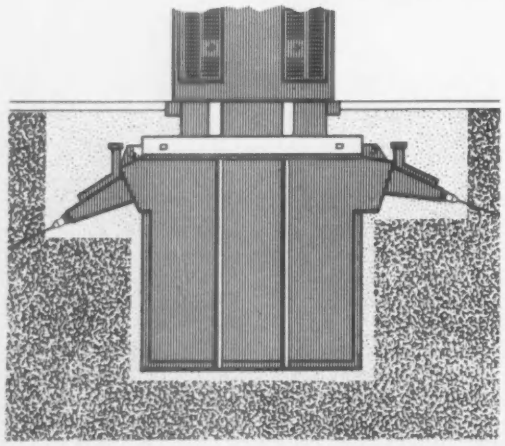


POLE-MOUNTING TYPE



SUB-STATION TYPE



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FDT 248/2

ELECTRIC BLANKET SAFETY QUESTIONED

STATISTICS for fires caused by electric blankets were given in the House of Commons last week. Mr D. Vosper, Minister of State, Home Office, said that the number of fires attended by fire brigades that were judged to be caused by electric blankets were 244 in 1957 and 396 in 1958. Figures for 1959 will be available shortly. Number of deaths reported in which electric blankets were involved were one in 1957, ten in 1958 and seven in 1959.

Mr Vosper was replying to a question by Miss A. Bacon who drew attention to a *Which?* report that 20 deaths had been caused by electric blankets in the last three years, and 2,600 fires reported to the insurance companies in one year alone.

Mr Vosper pointed out that BSI was reviewing specifications for electric blankets, and that the Home Office is undertaking a survey of "all fires caused by electric fires" (presumably fires of electrical origin) during the last two years.

College plans for nuclear reactors

SIX colleges have asked the Government for grants to cover the cost of building a low-powered nuclear reactor as part of their training facilities for engineers and physicists. This was stated in the House of Commons on behalf of the Minister of Science. Reactors are proposed by Birmingham; Imperial College and Queen Mary College, London; Manchester and Liverpool jointly; Southampton; and the Scottish Universities jointly with the Royal College of Science and Technology, Glasgow.

In another Parliamentary answer it was stated that facilities for training nuclear engineers and reactor physicists are offered at Birmingham, Durham, London, Manchester and Southampton Universities, so far as England and Wales are concerned. In recent years about 90 students have taken post-graduate courses in such subjects and about 100 students have chosen nuclear engineering or reactor physics as a special subject in the final year of their undergraduate courses.

Copper consumers oppose fixed price

ATTEMPTS by copper producers to bypass the London Metal Exchange by establishing a fixed price for copper appear doomed to failure in the face of world over-capacity and opposition from consumers. British and West German fabricators are against a fixed price, and there has been a change of heart among half a dozen countries who formerly favoured the idea. Belgium, France and Finland stand almost alone in favouring some form of fixed price in Europe. This was revealed during informal discussions in Paris at the recent biennial meeting of the International Wrought Non-Ferrous Metals Council, which provides a forum for European fabricators and their suppliers. The main hope of producers seems to be to continue to limit output.

Cookers go Ahead

THE production of electric cookers is now nearly equal to that of gas cookers. That is the conclusion for the latest figures in the hands of the Modern Cooking Promotional Committee. This follows the substantial rise in cooker production this year, amounting to 348,406 for the first nine months, compared with 298,680 for the corresponding period last year. This increase of no less than 17% is one on which the Committee can look with some pride as a tribute to their many activities in promoting electric cooking.

SHAVER PARTS DRAWBACKS APPLICATION

THE Board of Trade are considering an application for the allowance of drawback duty on certain parts for electric shavers when re-exported. The items concerned are blades and heads, and base metal parts of blades and heads. Interested parties should make representations to the Tariff and Import Policy Division of the Board of Trade.

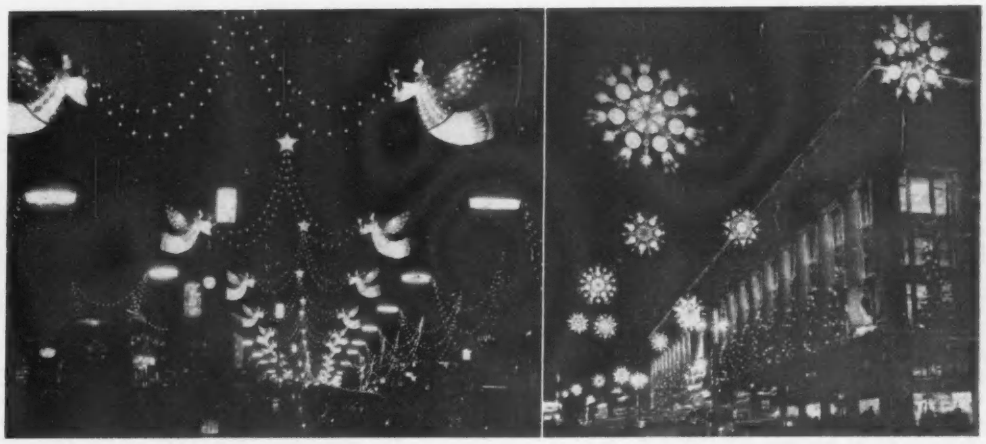
Higher tariffs likely in Midlands

MIDLANDS EB will have to lift revenue by over £3 million a year in order to meet higher costs, the Board chairman, Mr W. S. Lewis, has warned the Consultative Council. The Board have not yet discussed what tariff increases would be necessary, but the rise would not be steep, he said. The cost of bulk supplies was expected to rise by £1,220,000 a year, salary and wage increases would cost £995,000 and the net cost of the latest rise in coal prices would be £953,000 in a complete year. Profit would be reduced to about £1 million in the current year and, if tariffs were not increased, completely wiped out in 1961-62. Mr Lewis told the Council that the £2·8 million profit netted in 1959-60 was not excessive on a turnover of £58 million. Revenue had supplied 57·5% of capital expenditure. "Some people may say that is too much," he added, "but we have undertaken as an industry to raise at least 48%."

An experiment in estimated meter readings was commented on favourably by Council members. A pilot scheme is in progress in rural parts of Shropshire and Herefordshire, where the meters of 22,000 consumers are being read in alternate quarters and estimated accounts sent out for the other two quarters. Meter reading and billing cost £1,175,000 last year, so there is scope for considerable savings if the plan wins the goodwill of consumers.

CHRISTMAS LIGHTS IN LONDON'S WEST END

Switched on last Thursday they include angels along Regent St (left) and multi-coloured (and enlarged) snowflakes above Oxford St (right)



ELECTROMATICS AT OVER 1,000 A WEEK!

PRODUCTION of "Electromatic" washing machines is now at a rate in excess of 1,000 a week—and they are being sold—it is revealed in a statement by Rolls Razor Ltd., who, under a contract in force until the end of 1965, have exclusive right to produce the machines at a profit of 10% on manufacturing cost. And between 1 Jan. and 30 June, 1961, Rolls have the option to acquire the capital of Electromatic Washing Machine Co.—the well-known direct-sales firm controlled by Mr J. Bloom—for a maximum of £100.000 to be satisfied by the issue of deferred shares. But Mr Bloom, who holds 44% of the three million Deferred 1s shares, continues as managing director at least until 31 Dec., 1965.

Rolls Razor now anticipate a profit of £30.000 for 1960, based on trading for the first seven months and orders for washing machines since received by Electromatic. The company's Cricklewood factory has been re-equipped and revalued at £210,000. In order to ease a cash shortage the freehold will be sold and a 21-year lease taken.

Appliance users default

LOSSES among hire-purchase houses have spread to a company operating mainly in the electrical appliance field. Charterhouse Credit Co. has stopped taking new business because of substantial bad debts. The parent company, Charterhouse Group, has decided to guarantee all commitments of Charterhouse Credit, which was known as Noble Lowndes Finance until Charterhouse Credit acquired a 65% interest in July, 1959. Heavy losses have been reported by several hire-purchase companies in recent months, but these were mainly due to bad debts on car business and frauds by dealers.

Stabilise credit—B.E.A.M.A. plea

PRESSURE on the Government to ease hire-purchase restrictions continues. Now the TUC have added their voice to that of manufacturers in asking the Chancellor of the Exchequer for relief, and the chief of BEAMA has made an emphatic plea for stable credit control. Speaking at the Norfolk Electrical Circle's annual dinner in Norwich last week, Mr Stanley Steward, director of BEAMA, said the minimum H.P. deposit should be immediately reduced to 10% and kept there. "We do not seek the abolition of credit control, but we consider it essential for the controls to be maintained at a stable level," he said. Otherwise, appliance manufacturers could not operate efficiently and exports would suffer.

H.P. "Black List"

SEVEN leading hire-purchase concerns —Bowmaker, British Wagon Co., Lombank, Mercantile Credit Co., North Central Wagon and Finance Co., Olds Discount Co. and Scottish Midland Guarantee Trust—are setting up a nation-wide information service on individual credit ratings. They are acquiring Kemp's Mercantile Offices, publishers of *Kemp's Gazette*, which lists h.p. court actions.

Switchgear for Corby

SWITCHGEAR worth over £300.000 is to be provided by the General Electric Co. Ltd. for an outdoor substation of the CEGB at Corby, Northants. Increasing demand for electric power in the area, chiefly from a large steelworks, has necessitated an increase in the substation capacity. The plant to be supplied includes 13 132 kV, 3,500 MVA oil circuit-breakers, a 17-panel control board, relay panels, d.c. boards and outdoor isolators.

E.E. forms subsidiary in Portugal

ENGLISH Electric Co. has established a subsidiary in Portugal which will ensure the continuity of long-standing agency arrangements. Manager of the new company, English Electrica de Portugal, is Mr R. I. Lewis, who has been EE's technical representative in Lisbon for several years.

Higher fees for trade marks

AS from 1 May next, the Board of Trade will charge higher fees for trade mark applications and registrations and also for renewals on and after that date. The existing rates have operated since 1955. It is proposed to raise the present fees of applications, registrations and renewals of £2, £3 and £5, respectively, to £4, £4 and £6.

TALKS ON CABLES

"RUBBER and Plastics in Cables" will be discussed by about ten speakers at the IEE headquarters in London on 1 March. Sir Christopher Hinton will speak on the problems of electricity transmission, and other talks in the provisional programme include Mr N. Parkman, of ERA, on the electrical properties of polymeric insulating materials, and Mr K. H. Whitlock, of Du Pont Co., on recent developments in the use of neoprene for wire and cable. The conference is being organised jointly by the Plastics Institute and the Institution of the Rubber Industry. These two institutes will hold another joint conference on "Education and Training in the Plastics Industry" at IEE headquarters on 19 and 20 June.

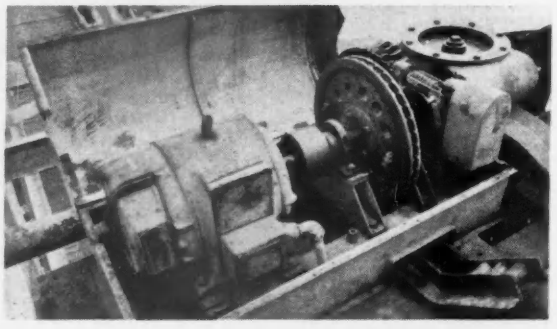
M-R go through Wholesalers

LIKE EMI, Morphy-Richards Ltd. will continue to use wholesalers for distribution of many of its appliances. Sir Joseph Lockwood, chairman of both companies since EMI took over Morphy-Richards, told distributors this at a recent luncheon.

CHATHAM BRIDGE CONVERSION

TWO 40-year-old bascule bridges at Chatham Dockyard have been converted from d.c. to a.c. operation by Crompton Parkinson Ltd. They span the narrow waterways beween basins 1 and 2, and 2 and 3, and each with a span of 86½ ft are wide enough to take motor traffic, with a catwalk on each side. 7½ h.p., 710 r.p.m. t.e.f.c., w.p. a.c. slip-ring motors have been installed, one to each leaf. The bridges are subject to considerable wind pressure, and a lack of rigidity had in the past resulted in broken shafts on the d.c. motors. The new motors and their transmissions—new flexible couplings and electro-magnetic brakes—have been mounted on special heavy bedplates which carry all the moving mechanism.

To provide full operation of each bridge on either side, a control cable has been installed in the tunnel, 100 ft beneath each bridge, which originally carried services from one side of the docks to the other. The leaves of the bridges are self-aligning, but if perfect alignment is not achieved, small adjustments can be made through inching buttons at the bridge centres. Murray Munro and Co. Ltd. were contractors for all mechanical and electrical work except running of conduit.



Motor, shipping coupling, magnetic brake with combined flexible coupling and gearing on the leaf of one bridge at Chatham Dockyard. Each leaf is operated by a 7½ h.p. slip-ring motor, and control of either bridge is from a single control house, with interlocking between bridge and boom gates

Lessons of Liverpool fire

MANY aspects of fire precaution practice in large stores were brought into question by the fire at a Liverpool store in June, as statements at the inquest on the victims of the fire showed. Now the Home Secretary has asked the Central Fire Brigade Committee to look into all these questions and a technical sub-committee has been set up to consider them.

Space talk for children

THE IEE Christmas holiday lecture for children this year will deal with British experiments in space. Dr R. L. F. Boyd will speak on "Space research by rocket and satellite" at the IEE lecture theatre on 3 Jan. and repeat the talk on 4 Jan. The lecture begins at 3 p.m. on both days, and admission is by ticket.

New I.C.I. Plastics Production Starts

Control plant of the new "Propathene" plant of Imperial Chemical Industries, at their Wilton Works, Middlesbrough

THE announcement last week by ICI that the new polypropylene plant at Wilton, with an annual production of 11,000 tons, is "on stream" heralds the arrival into general use of yet one more new material in the plastics range for general use. Propylene is the second in the range of oleofins-hydrocarbons in which the carbon and hydrogen molecules are in the proportion of 1:2—to be successfully polymerised. Ethylene, (C_2H_4) first polymerised 25 years ago by ICI into polythene at high temperatures and pressures, is now widely used both for electrical purposes and general usage, but its limitations lie in its limited rigidity and low softening point.

The new plastics is lighter than water, having a density of 0·9, and is as rigid as the harder p.v.c. plastics, but the rigidity is maintained up to 140°C to 150°C. It is resistant to practically all oils, fats, greases, acids and alkalis and the electrical properties, though not yet fully investigated, seem more than satisfactory.

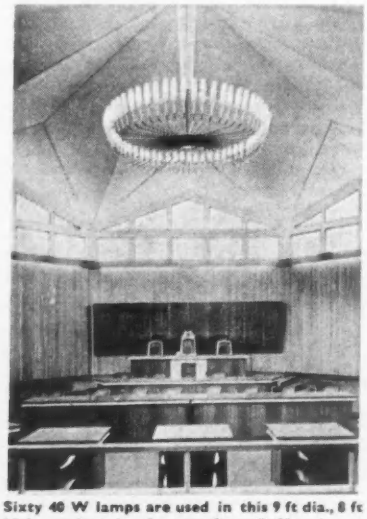
The new material will be marketed by ICI under the name "Propathene."

RECENT PLANT ORDERS

SHIPMENT of a cable contract worth over £100,000 for the USSR tyre factory at Dreifropetrovsk has been completed by Crompton Parkinson Ltd. Over 430 miles of various types of cable have been supplied, all manufactured to BS specification, in addition to Crompton motors, switchgear and transformer equipment worth over £500,000. The complete factory order, worth some £15 million, was placed with Rustyfa Ltd., of which Crompton Parkinson is a member.

Sets for Paper Mills

ORDERS valued at £330,000 for two turbo-generators to be installed at Aylesford Paper Mills, Kent, have been placed with the General Electric Co. Ltd. by Albert E. Reed and Co. Ltd. The orders cover a 10 MW pass-out condensing set and a 7 MW back-pressure set which will increase the total installed capacity to 52 MW—all GEC machines. The 7 MW set will be operated initially as a base-load topping unit, designed for steam conditions of 1,250 lb/sq in., 950°F. The 10 MW set will be supplied from the same steam range and will be fitted with a pressure-controlled pass-out for delivery of up to 180 klb/hr of process steam at 20 lb/sq in. The 11,000 sq ft surface condenser is to be made by Hick Hargreaves and Co., and Electroflo Meters Ltd. will supply a pressure- and temperature-reducing station.



Sixty 40 W lamps are used in this 9 ft dia., 8 ft high pendant in the new Council Chamber at Umtali, Southern Rhodesia, supplied by the General Electric Co, of England. It was produced from standard "Variform" components, and is the largest of its type so far

. . . and abroad

AEI Motor and Control Gear Division have recently received contracts worth over £100,000 for equipment for the petroleum industry. One of these is from the Kuwait Oil Co. and includes seven flameproof squirrel-cage motors of 500 to 750 h.p.

That Division has also received a further order from British Cellophane for three sectional drives, and another worth £100,000 for equipment for a second pulp mill for the Caima Pulp Co. of Portugal, including power house plant, switchgear, control gear and various motors.

The GEC have obtained a £70,000 order for a winding engine for South Africa. Of the double-drum double-clutch type, with steel drums 10 ft dia by 4 ft wide, it will be driven by a single a.c. induction motor. Mechanical equipment will be made to GEC design by East Rand Engineering Co. in South Africa.

FRIGIDAIRE DEALER TAKEN OVER

BRETT DANIELS LTD., large distributor for Frigidaire in North London, has been taken over by Southcros, a member of the Norcros group. In a deal worth £200,000, Southcros are allotting 36,000 5s Ordinary shares and 45,000 6½% £1 Preference, plus a cash payment of £46,000.

Flooding at Thornhill

EXTENSIVE flooding in the area put Thornhill power station, near Leeds, out of action last week-end. At 4 p.m. on Saturday, 26 Nov., the River Calder was 4ft above normal, and pumps and condensers were quickly choked, necessitating shutting down the station (which had been generating 135 MW) at 7 p.m. With no signs of abatement, and with memories of the 1946 flooding, motors on low level were taken to high ground, and that night the river rose to 7½ ft above normal level. Water seeped through conduits and cable pipes and the pits of the five alternators were flooded. At 1 a.m. on Sunday, with slight improvement in the position, a start was made on putting the motors back, and at 10 a.m. the first machine (30 MW) began running to be followed by a 45 MW set at 5 p.m., and by Monday morning the station was operating normally, thanks to sterling work by employees of the Yorkshire Division, aided by the NFS and local fire brigade.

Heating Show in North

MANCHESTER is to have a home heating exhibition. The First Domestic Heating and Insulation-in-the-Home Exhibition is scheduled to be held at the Free Trade Hall from 19-22 Sept. Organisers are Clarke and Rhodes Ltd.

RAPID GROWTH IN GUERNSEY

A SWITCHBOARD made of Sicilian marble, framed in mahogany—that was the picture in Guernsey's first power-house when it was commissioned in 1900. But the price of a unit was 5·6d then against 2·4d now, the Bailiff of Guernsey, Mr W. H. Arnold, and members of the States of Deliberation were told when they visited St. Sampson's power-house recently to mark 60 years of electricity on the island. Growth has been at an even faster rate than on the mainland. The States of Guernsey Electricity Board have trebled sales in the past decade and expect output to rise from 37·8 million units this year, almost 2,700 units per consumer, to 43¼ million in 1961. New administrative headquarters will be occupied during 1961-62.

RELIABILITY IN PROCESSING DATA

REALISTIC data and comparisons between the reliability of electrical and mechanical parts of data processing systems may become available from an informal discussion which the Institution of Mechanical Engineers is organising on 5 Jan. next. Under the title "The Reliability of Mechanical Engineering Parts of Data Processing Systems," the Institution expects the emphasis of the meeting to be placed on mechanical construction and reliability and on features of design and manufacture of particular importance to accurate and continuous operation. The meeting will take the whole day. In the morning there will be consideration of the present position and of the kinetics problems of high-speed mechanisms. In the afternoon and evening, consideration will be given to the production of electronic equipment. Forms for the meeting may be obtained from the secretary, I.Mech.E.

Sayings OF THE WEEK

"The Chinese don't place orders. They negotiate. Then if they are still interested they make very firm inquiries." . . . MR H. BINYON, sales director, Solartron Electronics, on returning from a visit to Peking.

"And when I tell you that we had to co-ordinate no less than 37 different countries with contractors of seven different nationalities, you will readily understand that this widespread knowledge of the English language considerably eased our task." . . . MR G. F. KENNEDY, speaking on the Aswan Dam project at the Institute of Civil Engineers.

"In spite of the rising standard of living, continuous domestic heating is still regarded as a luxury. Cars, television, spin dryers and the like are regarded as near necessities." . . . MR R. M. LANG, in electric floor-warming symposium at Torquay.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, November 29

	£ per ton	Weekly change £
COPPER, standard class A		
(settlement) ...	231½	+¼
,, (3 months)	228½	+1¼
LEAD, refined pig, 99·97% purity		
(cash)	66⅞	−⅜
,, (3 months)	67½	−¼
TIN, refined, min. 99·75% purity		
(settlement)	799	−1
,, (3 months)	797	—
ALUMINIUM, ingots 99·99·5% ...	186	—
,, wire bars (4×4×54")	193½	—
BRASS Strip 63/37	204½	+3½
SILVER (Troy oz)	79½d	—

	£ per ton	Weekly change £
ZINC, virgin, min. 98% purity		
(cash)	87	−1½
,, (3 months)	86½	−1⅛
RUBBER, per lb		
No. 1, RSS, spot	25½d	—
c.i.f. basis, ports, Feb. ...	25½d	+¼d
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	68	—
Mild Steel Tape (0·04 × 1½ in.)	53*	—
NICKEL (home)	600	—
MERCURY (76 lb flask)	70½	—
AMERICAN PRICES:		
Copper, electrolytic (per lb) ...	30c	—
Lead, (New York)	12c	—

* *Tape Price, now an average, includes varnishing*

E.P.E.A. DINNER

THAT the influence of the EPEA had penetrated even to the House of Commons was apparent, when a passage from the journal was quoted during the recent Electricity Bill, said Sir Robertson King, K.B.E., COMP. I.E.E., M.INST.F., when he proposed the toast to the Association. The occasion was the annual dinner held in the Connaught Rooms last Friday. Sir Robertson continued by referring to the success achieved by the Association in fulfilling the aims of its founders to establish better conditions for engineers. Commenting on the president's work for the Association in the East Midlands and in particular his connection with Staythorpe, where he is charge engineer, Sir Robertson recalled a protracted dispute when the station was under construction whether the sets should be aligned north and south or east and west.

In reply, the president, Mr H. Brockelsby, confirmed that the alignment was east and west and he wondered if the alternative would have raised the station's position in the league table. He thought the Association had now approached a turning point. In the future it would no longer be concerned merely with working conditions, but would increasingly aim to promote a spirit of "get-togetherness" among the engineers in the ever-expanding supply industry. In conclusion he thanked the dinner organising secretary, Mr F. H. Smethurst, and referred to the enthusiasm of Mr George Essex, a founder member of the Association, who was shortly to retire.

Cape Asbestos reorganises

THE Cape Asbestos Co. is forming three new subsidiaries as part of a plan to decentralise control of the group's activities. Cape Insulation and Asbestos Products Ltd. will take over the manufacture and sale of thermal insulation materials and the work of Contracts Division, from 1 Jan. Capasco will make and sell friction materials and plastics, and Cape Asbestos Fibres Ltd. will distribute fibres.

Radiotelephone Guide

A 12-PAGE booklet has been prepared by Automatic Telephone and Electric to explain briefly the principle and applications of v.h.f. radiotelephone equipment. After explaining briefly what v.h.f. radio telephone is, the booklet gives some elementary guidance on how to plan a scheme and to estimate its relative merits when compared with alternative methods.

News in Brief

Import duty on certain refrigeration-control parts and accessories is now refundable when re-exported, under a new Drawbacks Order by the Treasury.

The fifteenth annual examinations to be conducted under the ASEE Diploma Scheme will take place at various centres throughout Gt. Britain on 17-19 May, 1961.

465 guests attended the Midland Electrical Engineers' Association annual ball when Mr G. A. P. Lewis, president, announced that £150, proceeds of the previous ball, had been handed to the IEE Benevolent Fund.

Subject to the consent of the Department of Health, Ardrossan Town Council are to install under-floor electric heating in 18 houses to be built at Kilmahew St.

Son et Lumière floodlighting and recorded commentary may be applied to Stirling Castle.

The Private Members Bill to be based on recommendations of the Molony Committee on consumer protection is to have a second reading debate in the House of Commons on 27 Jan. The text of the Bill has not yet been published.

Nine posts of "Training Development Officer" under the industrial training council scheme for apprenticeship training have been created and five appointments have so far been made, says the Ministry of Labour.

Plans for setting up a research association to cover the machine-tool industry have reached the stage where a Director of Research is being sought and an application to DSIR for a grant is in preparation.

Company Activities

GLOOM, gathers. Hire-purchase companies in difficulties, 18,000 on short-time at Ford's, refrigerator and electric cooker prices cut by GEC, the nation's stock of refrigerators now standing at around 500,000 units, friction over the engineers' wage claim—these were the latest and the biggest blows buffeting stock markets last week and were more than enough to precipitate public selling and professional "bear" selling. In one of the dreariest weeks for months, the *Financial Times* industrial ordinary index was lopped 11·3 points to 303·1.

There can be little doubt that the credit squeeze must now be at, or have passed through, the point at which it was intended to level back consumer spending, and without some easing very shortly its continuance will amount to no more than financial sadism. It is quite clearly the verdict of the market, however, that in the short run trading conditions for British industry will deteriorate before the cyclical improvement sets in. At the same time, longer term investors should now assume a vultural aspect on the likely prospect of many first class shares attaining new "lows" for the year. "In" and "out" of the market is fair enough game for the professionals but for John Citizen who is concerned with the growth of his free funds over the years, steady and selective equity investment is still the surest answer, and the time approaches when we shall read many times the word "bargain" in the financial columns of the Press.

In contrast to the advance of the previous week, electrical shares, too, had to sound the retreat. And here the "heavy brigade" was fast on the run. Again, reasons were not hard to find. GEC may have pleased the housewife with its announcement that it is cutting the prices of its refrigerators, but it certainly did not please the market. Moreover, the warning given by Mr E. Fowler, managing director of the GEC Domestic Equipment Group, to the effect that the Government's restrictive measures in preventing large production runs may price GEC products out of both home and overseas markets did nothing to help matters. The reflection of that on the stock market was a 1s 9d tumble in the £1 Ordinary shares to 31s 9d—a new "low" for the year and on which a dividend yield of 6·3% is now offered. That, of course, assumes that last year's 10% dividend (1·9 times covered) is maintained in the current year.

English Electric's £1 Ordinary shares also dropped from 33s 9d to a new 1960 "low" of 31s 9d on which the yield is now 6·3%. And not to be left out of it, AEI, the biggest of Britain's electrical battalions, buckled back 2s 9d to a new 41s 9d "low" to show a yield of 7·2%.

Elsewhere, Decca Record dropped 2s to 52s, EMI came back a further 1s 3d to 42s 6d, E. K. Cole eased 2s 3d to 18s 7½, a 1960 "low," a feat also achieved by Pye with their 1s 9d drop to 12s 9d. After a rise of 3s to 53s BICC came back on profit-taking to 49s 9d, while Hoover "A" Ordinary, at one time inspired by their transatlantic tinge to touch 45s 9d, a rise of 3s, came back to finish the week at 42s 9d.

But the gloom was not altogether undiluted. Dimplex went up to touch a new peak of 49s 3d on strong demand, while the 5s Ordinary shares of Berry's Electric Magicoal warmed up 2s 9d to 51s 6d on the doubled interim of 13¼%. There was also a statement here of a "satisfactory increase" in sales and profits for the half-year to 30 Sept., 1960, a one-for-three free scrip issue and a forecast to put the year's total dividend up to the equivalent of 40% against last year's 30%. As hire-purchase is not a major factor in the company's sales and as there is a buoyant export demand still for their products, Berry's is obviously one of the better bargains now offered on the electrical share market.—*From our City Correspondent.*

Ada (Halifax)

There is no interim dividend for the year to 31 March, 1961, the company (which is now controlled by Philips Electrical Industries) having made a loss estimated at £7,000 for the half-year to 30 Sept. The board does not anticipate an early end to the company's difficulties, in view of the unfavourable trading conditions.

Allied Ironfounders Ltd.

Announcing an unchanged interim dividend of 7½%, the directors add that the group profits to date are running at the same level as for the corresponding period of last year.

Berry's Electric Magicoal Ltd.

Another bonus issue is to be made, this time on a one-for-three basis. This news is given by the directors along with an increase in the interim dividend for the year to 31 March last, 13¼% as against 6¾% last time, which is intended to even out the disparity between the interim and final dividends. With a satisfactory increase in sales and profits for the six months to 30 Sept. last, and in the absence of unforeseen difficulties, they forecast that the final dividend on the enlarged capital will not be less than 20%, to give the total equivalent for the year on the old capital of 40% compared with 30% for the previous year.

Crabtree Electrical Industries Ltd.

Record sales were achieved in the year ended 31 July last, but taxation negatives the result of the considerable efforts, Mr J. A. Crabtree, the chairman, points out. The demand for the firm's products is increasing and the year ended with a substantial order book. Since the

Year to 31 July	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1956	356,157	116,102	31	20	29/3	22/3
1957	422,000	150,950	41	20	26/6	23/-
1958	323,387	112,572	30	20	33/9	24/4
1959	437,231	222,752	58	20	54/9	27/7
1960	537,536	206,063	27	16¼*	39/9	23/-

* Plus 100% capital bonus.

end of the year work has started on projects involving capital commitments of a further £200,000 in the next 12 months. Extensions to the works at Walsall and Brownhills have begun, plus the erection of another factory at the latter site, and Mr Crabtree is confident of the future.

Dictograph Telephones Ltd.

At the end of August last there was a record volume of business in hand, and so far in the current year sales show no sign of diminution, Mr P. U. Summer, chairman, reports. Although anticipating a favourable report next year, he warns that rising labour costs may well affect profit margins and sales.

Southern Areas Electric Corpn.

Value of group orders received for 1960 to date is 60% in excess of that for 1959, Mr J. W. Milligan, managing director, stated last week prior to leaving on a USA tour to visit the group's associates. The experience of the individual subsidiaries varied considerably, and he warned that the market remains highly competitive while labour and other costs continue to rise.

Sun Electrical Co. Ltd.

The past year's results were a record, and the directors report that with the level of sales maintained for the first six months of the current year, they are hopeful that the trading results will once

Year to 30 Apr.	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1956	165,458	64,590	110	25	43/6	34/-
1957	162,722	58,158	98	25	46/-	44/9
1958	152,438	55,058	93	25*	61/-	47/3
1959	139,140	54,014	41	15	17/3	8/3
1960	189,079	67,816	55	18¾	17/10	15/-

* Plus 100% capital bonus.

again produce a satisfactory return. The increased level of sales would not have been possible if the improved branch premises, which have been provided during the past three years, had not been available. Looking further ahead, they have opened a sinking fund insurance policy with an annual premium of £1,505 to provide a substantial sum in the year 2035 when the leases of the head office premises expire.

Dividends Declared

Harland Engineering Co. Interim 4% (*same*).

Worthington-Simpson. Interim 10% (7½%).

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

1 Dec.—Chesterfield B.C. Supply of: (1) 88 25 ft tubular steel columns and one wall bracket; (2) 71 140 W sodium Group "A" lanterns; (3) 18 3 by 80 W fluorescent lanterns and 18 400 W colour-corrected mercury lanterns complete with lamps/gear; (4) 71 140 W sodium lamps/jackets/gear for A61 Exeter-Leeds Trunk Rd lighting.—Advertised 17 Nov. issue.

1 Dec.—East Kilbride. Electrical work in erection of animal house and laboratory at Hairmyres Hospital. Applications to Secretary, Western Regional Hospital Board, 351 Sauchiehall St, Glasgow C.2, by above date.

2 Dec.—Renfrew C.C. (2) Electrical work in the replacement of Greenock Academy. Applications to County Clerk, R. Urquhart, County Bldgs, by above date.

2 Dec.—Whitchurch U.D.C. Installation of wiring and o/h tracks included in alterations to provide slaughter hall at public abattoir.—See 24 Nov. issue.

3 Dec.—Cambridgeshire C.C. Supply, erection, wiring and fitting; (1a) nine 35 ft steel columns with 200 W sodium lighting at Caxton Gibbet roundabout (A45 and A14); (1b) eight 35 ft steel columns with 200 W sodium lamps at Four Went Ways roundabout (A11 and A604); (2) five 25 steel columns with 3 by 80 W fluorescent lamps at Bury Toll junction near Newmarket (A11 and A45).—Advertised 10 Nov. issue.

3 Dec.—Colwyn Bay B.C. (Contract 1) Supply and installation of 99 Class "A" concrete columns and sodium lanterns; (2) supply of 480 Class "B" concrete columns; (3) supply of 480 60 W sodium lanterns/gear; (4) supply of 270 time switches; (5) erection and installation of 270 time switches; (6) cable duct laying; (7) removal of existing gas lamps.—See 24 Nov. issue.

3 Dec.—Huyton with Roby U.D.C. Applications invited for inclusion in selected list for (Tender 12) public lighting equipment.—See 24 Nov. issue.

3 Dec.—Kingsbridge R.D.C. Rewiring of Manor Hse. Council Clerk: J. H. Savidge.

3 Dec.—Swansea B.C. Electrical installation in proposed primary school at Sketty Pk, Swansea.—See 24 Nov. issue.

3 Dec.—Tandragee U.D.C. Fluorescent street lighting installation.—See 24 Nov. issue.

5 Dec.—Chigwell U.D.C. (i) Supply of (a) 21 steel columns and (b) lanterns/lamps; (ii) erection and installation of 21 200 W sodium units for A11 No. 2 lighting scheme.—See 3 Nov. issue.

5 Dec.—Eccles B.C. Electrical installations in: (1) 40 houses, New Hall Ave; (2) four houses, Scott Ave.—See 24 Nov. issue.

5 Dec.—Liverpool. Electrical supplies. Secretary, Garnet Chaplin, South Liverpool Hospital Management Committee, Sefton General Hospital, Liverpool 15.

5 Dec.—Manchester C.C. Supply and installation of outside lighting of existing aeration plant at Davyhulme Sewage Wks.—Advertised 3 Nov. issue.

5 Dec.—Romford B.C. Electrical installations in (1) Town Hall extension and (2) pavilions and parks depot, Central Park. Borough Engineer and Surveyor, Town Hall. Deposit £2 2s each contract.

5 Dec.—Ross-on-Wye U.D.C. Supply and erection of steel columns/brackets with 140 W sodium lanterns and ancillary work. Engineer and Surveyor, Council Offices, Broad St.

5 Dec.—York T.C. Supply and erection of two 1,867 g.p.m. centrifugal pumps and gear for recirculation pumphouse at Naburn Sewage Purification Wks.—See 17 Nov. issue.

6 Dec.—Grimsby R.D.C. Supply and erection of 14 25 ft concrete columns/lanterns/control gear along A16 Louth Rd, Waltham. Surveyor, 1 Deansgate Terr. Deposit £2 2s.

7 Dec.—Durham C.C. (a) Electrical installations in Cleadon new County Junior School and Ryton Modern School extensions and adaptations. Electrical installations in standard police houses, Greenfield estate, Swalwell. County Architect, South St, Durham. Applications by above date.

7 Dec.—Evesham B.C. Supply and installation of: (a) 33 30 ft tubular steel columns with 200 W sodium lighting along A435; (b) 20 existing columns converted to 200 W sodium along A433; (c) 41 25 ft tubular steel columns with 140 W sodium lamps/gear, along A44.—See 24 Nov. issue.

8 Dec.—Heston and Isleworth B.C. Supply and erection of 41 Group "A" steel columns with mercury colour-corrected lamps/lanterns/gear and removal of 28 existing columns along Vicarage Farm Rd, Hounslow.—Advertised 24 Nov. issue.

8 Dec.—Irish Lighthouse Service. Supply of lamps for year to 31 Dec., 1961. Irish Lights Office, Dublin.

8 Dec.—Swansea B.C. Supply of one 3 kW d.c. generator.—See 17 Nov. issue.

10 Dec.—Bootle B.C. Supply of (Item 13) cables and electrical goods and (Item 14) lamps for year from 1 April, 1961. Borough Surveyor, Town Hall.

10 Dec.—Cornwall C.C. Applications invited for inclusion in approved list for (Item 17) electrical installations to County Architect, County Hall, Truro, by above date.

10 Dec.—Edinburgh C.C. Supply and erection of five electrically operated overhead doors at Craigmillar Refuse Disposal Wks. Engineer and Manager, Lighting and Cleansing Dept., 329 High St.

10 Dec.—Northwich U.D.C. Installation of power points in 50 pre-war houses. Engineer and Surveyor, Council Hse.

12 Dec.—Downpatrick R.D.C. Electrical work in two blocks of four-storey maisonnettes and one block of three-storey single-person flats in Windmill St, Ballynahinch.—See 24 Nov. issue.

12 Dec.—Grimsby B.C. (c) Electrical installation, on fixed-price basis, in remodelling South Parade Primary Junior School.—See 24 Nov. issue.

12 Dec.—Manchester C.C. Supply and erection of passenger lift in City Courts and Juvenile Court.—See 24 Nov. issue.

12 Dec.—Roscommon C.C. Supply and installation of 3-ph. motors, horizontal centrifugal pumps and water level indicator at Monksland, Athlone. Details from consulting engineers, 4 St. Francis St, Galway. Deposit £5 5s.

12 Dec.—Ryton U.D.C. (5) Electric lighting and heating work in proposed eight single-person dwellings and three aged persons' bungalows. Surveyor, Council Offices, Ryton Tower.

12 Dec.—Stockport B.C. 2. Electrical installation proposed Welfare Clinic, Longford Rd West, Reddish.—See 3 Nov. issue.

12 Dec.—West Hartlepool B.C. Electrical installation in 16 old people's flatlets, Owton Manor estate.—See 24 Nov. issue.

13 Dec.—Kirkcaldy T.C. (b) Electrical work in erection of new hall at Links St.—See 3 Nov. issue.

14 Dec.—Kingston upon Hull C.C. Light and power installations in Adelaide County Primary School. City Architect. Deposit £2, payable to City Treasurer.

14 Dec.—Larne B.C. Rewiring of 24 Arcon prefabricated bungalows, Edward Ave. Borough Surveyor, 8 Victoria Rd.

14 Dec.—Matlock U.D.C. Supply and installation complete of nine sewage pumps at four pumping stations in Darley Vale.—See 6 Oct. issue.

14 Dec.—Waterford C.C. Supply and erection of two 20 g.p.m. pumps and 380 V 3-ph. motors for Kill and Bonmahon water supply scheme.—See 17 Nov. issue.

15 Dec.—Stockport T.C. Electrical installation in new dormitory wing and extension at "Reinbek," Aged Persons' Home, Bramhall La. Borough Architect, Town Hall.

16 Dec.—Maidstone B.C. Electrical installation in conversion of 13 London Rd into an old people's hostel. Borough Engineer, Palace Ave.

16 Dec.—Sunderland B.C. Electrical installation in Maternity and Child Welfare Clinic, Hylton Castle estate.—Advertised 24 Nov. issue.

16 Dec.—Wandsworth B.C. (h) Supply of lamps; and (i) electrical works for year from 1 April, 1960.—See 24 Nov. issue.

17 Dec.—Birkenhead B.C. Supply of lamps for year to 31 March, 1962. Manager, Works and Bldgs.

19 Dec.—Nottingham T.C. Supply of (Item 1) lamps and accessories for schools, etc., for year from 1 April, 1961. Director of Education, W. G. Jackson, Exchange Bldgs.

19 Dec.—West Lothian C.C. Supply and erection of 31 200 W sodium lanterns on 35 ft steel columns with 10 ft 6 in. outreach for A8/A89 Starlaw and A8/A899 Broxburn junctions lighting.—See 24 Nov. issue.

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 108 queries answered this week

"Zenith" lampholders—agents for? A.E.—Walter Logan and Co. Ltd., 34 Oak Tree Dr, N.20.

"Winton" vacuum cleaners—address for? M.A.N.W.E.B.—Phoenix Sales Ltd., 11 St. Andrew St, E.C.4.

"Cinch" terminal blocks—makers of? O.L.—Carr Fastener Co. Ltd., Pinfold La, Stapleford, Nottingham.

"Eastwoods" towel rails—makers of? E.E.B.—Eastwoods Ltd., 158 City Rd, E.C.1.

"Johnson" wax polishers—makers of? S.W.E.B.—S. C. Johnson and Son Ltd., West Drayton, Middx.

"Elremco" time delay relays—makers of? T.E.—Electrical Remote Control Co. Ltd., Harlow New Town, Essex.

"Earlywarm" blankets—makers of? M.P.—Charles Early and Co. Ltd., Witney Mills, Oxfordshire.

Helimatic Ltd.—address for? E.T.—22 Buckingham Palace Rd, S.W.1.

"Radiopage" intercommunication systems—makers of? J.B.—British Communications Corpn. Ltd., Exhibition Grounds, Wembley, Middx.

"Sirram" car kettles—suppliers of? P.P.L.—Hawker Marris Ltd., 34-54 Spencer St, Birmingham 18.

20 Dec.—Southampton B.C. (a) Electrical installation renewal at Millbrook Secondary Boys' School and (b) electrical installation in new Glen Eyre Secondary Boys' School. Applications to Borough Architect, Civic Centre, by 5 Dec.

21 Dec.—Fareham U.D.C. Supply and installation of sewage pump, complete with motor and control gear for Peel Common.—See 24 Nov. issue.

22 Dec.—Ealing B.C. Electrical installation renewal at St. Ann's Secondary Girls' School, Springfield Rd. Borough Engineer, Town Hall, W.5. Deposit £1.—Advertised in this issue.

30 Dec.—Monaghan C.C. (b) Erection and installation of two pumping sets to deliver 28 g.p.m. at a 106 ft head for Rockcarry scheme. Supply and/or erection of two 42 g.p.m. pumps at a 128 ft head for Newbliss. Details from consulting engineer, E. R. Ryan, 1 Montpellier Terr, Galway. Deposit £10 10s each contract.

3 Jan.—Radcliffe B.C. Supply and installation of 43 140 W sodium lamps on 25 ft columns and brackets, plus removal of 28 existing units along A667, Ringley Rd. Engineer and Surveyor, Town Hall.

10 Jan.—Dunblane B.C. Supply and erection of seven Group "A" concrete columns/lanterns/auxiliary equipment, plus the resiting of six columns along A9.—See 10 Nov. issue.

1 Feb.—Oxford T.C. Supply and erection of two high-lift 3,500 g.p.m. and two low-lift 3,850 g.p.m. pumps complete with motors, switchgear and cabling.—See 10 Nov. issue.

13 Feb.—Birmingham Tame and Rea. Supply and erection of electrically driven rope hauled sewage distributors to distribute between 11·6 and 34·8 m.g.d. over 6¼ acres. District Drainage Board Engineer, Rookery Pk, Erdington, Birmingham 24.

No date stated—Limerick T.C. Supply of electrical laboratory equipment. Chief Executive Officer, Municipal Technical Institute, O'Connell Ave.

No date stated—N.I. Hospita's Authority. Electrical engineering services installation in new home for nurses at Ards Hospital. Secretary, 27 Adelaide St, Belfast.

No date stated—North of Scotland H.E.B. 33 kV switchgear for Burghmuir substation, Perth.—Advertised 17 Nov. issue.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

7 Dec.—Egypt. Electrical supplies for refinery depots. Financial and Commercial Management, General Petroleum Authority, 44 Sh. Abdul Moneim, Dokki, Cairo. B.o.T. (ESB/30719/60).*

7 Dec.—Rhodesia and Nyasaland. Plastics insulated cables (two items), 35 tons h.d. bare copper wire. Town Clerk, P.O. Box 591, Bulawayo. B.o.T. (ESB/30046/60).*

8 Dec.—Belgium. Grey plastics sleeving and black plastics adhesive tape. Ministere de la Defense Nationale, Administration Generale du Budget, Direction Générale des Approvisionnements, Direction Supérieure des Achats de Materiel, Service d'Achat du Matériel Electrique, Quartier Prince Baudouin, Place Dailly, Bruxelles. B.o.T. (ESB/29477/60).*

13 Dec.—America. Two 250 kVA transformers. Dept. of the Interior, Bureau of Reclamation, Bldg 53, Denver Federal Center. Denver 25, Colorado. B.o.T. (ESB/30531/60).*

13 Dec.—Canada. 55 and 25 ton bridge cranes and a 16 ton gantry crane. Saskatchewan Power Corpn., Regina. B.o.T. (ESB/30558/60).*

13 Dec.—Singapore. 2,000 yd 6·6 kV cable. City Council. B.o.T. (ESB/30588/60).*

14 Dec.—Pakistan. (1) 3,900 ft 1/·044 12-core and (2) 8,700 ft 1/·044 20-core 660 V p.i.s.w.a. metal-sheathed cable. Chief Controller of Stores, E.B. Railway, Pahartali, Chittagong. B.o.T. (ESB/30785/60).*

14 Dec.—Rhodesia and Nyasaland. Six 200 kVA 3-ph. transformers. Town Clerk, P.O. Box 591, Bulawayo. B.o.T. (ESB/30047/60).*

15 Dec.—America. Two duplex 7·2 kV metalclad switchboard panels, bus structures, grounding equipment, water level telemetering equipment. Office of the District Engineer, U.S. Army Engineer District, 628 Pittock Block, Portland 5, Oregon. B.o.T. (ESB/30803/60).*

15 Dec.—S. Africa. Insulation test sets, phase sequence indicators, voltmeter, variable auto transformers, etc. Town Clerk, City Hall, Paul Kruger St, Pretoria. B.o.T. (ESB/30521/60).*

18 Dec.—Kuwait. 220,000 yd 1·1 kV underground cable. Dept. of Electricity, Water and Gas, Kuwait. B.o.T. (ESB/30596/60).*

21 Dec.—Burma. (1) Cables and accessories; (2) three 500 kVA transformers; (3) l.t. distribution switchboards and switches; (4) lamps and fittings. Chairman, Board of Management for the Port of Rangoon, P.O. Box 1, Rangoon. B.o.T. (ESB/30016/60).*

21 Dec.—India. Cable, p.i.l.c.d.s.w.a., from 660 V to 11 kV, 14 items, and 19,000 ft p.i.l.c.s.w.a. 1·1 kV 4-core 0·0225 sq in. cable. Chief Purchase Officer, National Coal Development Corpn. Ltd., 1 Council Hse St, Calcutta 1. B.o.T. (ESB/30502/60).*

21 Dec.—Uruguay. One million metres telephone cable and (closing date: 22 Dec.) 400 kg of 2 mm diameter solder. Administracion General de las Usinas, Electricas y los Telefonos del Estado, Palacio de la Luz, Paraguay 2431, Montevideo. B.o.T. (ESB/30747/60DLF).*

22 Dec.—Pakistan. 77,150 yd telephone cable. Mr F. Rizwi, Purchase Co-ordinating Officer, Block No. 32, P. and T. Directorate General, Karachi. B.o.T. (ESB/30454/60).*

22 Dec.—Pakistan. 400 V 3-ph. a.c. meters. Executive Engineer, Stores, Electricity, Bharat Bldg, Lahore. B.o.T. (ESB/30834/60).*

22 Dec.—Rhodesia and Nyasaland. 11 kV distribution transformers. Secretary, Southern Rhodesia Electricity Supply Commission, P.O. Box 377, Salisbury. B.o.T. (ESB/30776/60).*

27 Dec.—Pakistan. Cable, 21 items. Mr F. Rizwi, Purchase Co-ordinating Officer, Block No. 32, Posts and Telegraphs Directorate General, Karachi. B.o.T. (ESB/30455/60).*

3 Jan.—Argentina. 1,100 nickel iron accumulators and 600 special accumulator blocks, etc. Oficina de Licitaciones, Secretaria de Transporte, Empressa Ferrocarriles del Estado Argentino, Superintendencia de Compras y Almacenes, Avda. 389 5° Piso, Buenos Aires. B.o.T. (ESB/30501/60).*

3 Jan.—Iran. One 200 kW and two 150 W diesel generating sets. Iranian Sugar Factories Co., Teheran. B.o.T. (ESB/30712/60).*

9 Jan.—Sudan. 120 weatherproof 140 W h.p.m.v. floodlights. Office of Controller of Stores, Sudan Railways, Atbara. B.o.T. (ESB/30851/60).*

10 Jan.—Sudan. Underground cables. Controller of Stores and Workshops, Posts and Telegraphs Dept., Light Industrial Area, Khartoum. B.o.T. (ESB/30710/60).*

19 Jan.—Australia. Insulation and resistance testers: 15 items. Controller, Postmaster-General's Dept., 114 Russell St, Melbourne. B.o.T. (ESB/30759/60).*

5 Feb.—Kuwait. 33 kV steel tower transmission lines, Khalidyah to Sulaibiyah substations and Sulaibiyah to Jahara Village. 33 kV metal-clad switchboards and remote control boards for Sulaibiyah and Jahara substations. Dept. of Electricity, Water and Gas. B.o.T. (ESB/30597 and 8/60).*

15 Feb.—Portuguese East Africa. Twelve cranes for Beira Port. Ports, Railways and Transport Dept., Lourenco Marques. B.o.T. (ESB/30543/60).*

28 Feb.—India. Switching and booster transformer station equipment for 25 kV 50 c/s railway scheme on Sealdah-Ranaghat and Dum Dum-Bongaon sections on Eastern Railway. General Manager and Chief Engineer, Railway Electrification, 235 Lower Circular Rd, Calcutta 20. B.o.T. (ESB/30717/60).*

CONTRACTS PLACED

Berkshire C.C. Supply and erection of 28 35 ft steel columns with 200 W lanterns/gear for Botley and Woodstock Rd roundabouts, Oxford Southern and Western By-pass, Abacus Municipal Ltd.

Burnham-on-Sea U.D.C. Supply of 22 sodium lanterns, lamps and gear, Atlas Lighting Ltd., £242; supply, erection and wiring of columns, Engineering and Lighting Equipment Co., £1,584.

Ellesmere Port B.C. Provision and erection of 58 Group "A" lighting units, plus resiting of 34 Group "B" units along various roads, Engineering and Lighting Equipment Co. Ltd.

Kent C.C. Supply and erection of 35 ft steel columns with 200 W lanterns and gear at A21-A224, Halstead Roundabout, Abacus Municipal Ltd.

Kingston upon Hull C.C. Electrical installations in 157 dwellings, Boothferry estate, Reliance Electrical Co.

London C.C. Electrical work at: Alpha Sq site, Samuel Reed and Sons, £5,788; Ashmole Pl area, Electrical Contracting Co., £3,115; St. Helier estate, F. J. Baynes and Co. Ltd., £5,653 and £9,064.

Mansfield T.C. Supply and erection of 31 Group "B" steel columns complete with tungsten lanterns on Oak Tree estate, Abacus Municipal Ltd.

Newcastle upon Tyne C.C. Supply and installation of telephone system in new Town Hall, Barras Bridge, Associated Electrical Industries Ltd., £24,470.

Pelton P.C. Supply and erection of 30 concrete columns, lanterns and lamps on Vicarage housing estate, B. L. Oliver.

Seaton Valley U.D.C. Supply and erection of 327 street lighting units and supply only of 132 units, Concrete Utilities Ltd. Recommended.

Stockport B.C. Electrical installation renewal at Alexandra Pk Primary School, F. Mather and Co, £2,498.

Watford B.C. Street lighting North Orbital Rd, Midland Lighting and Bldg Ltd., £3,549. Recommended.

TRADE NOTES

Change of Name. The Electric Resistance Furnace Co. Ltd. changes its name to Efco Furnaces Ltd. as from 1 Dec.

Expansion. Stearn Electric Co. Ltd. have expanded three branches. At Daleside Rd, Nottingham, a new two-storey block has been occupied; at Preston, the company have moved into Magnet Hse, in Derby St, previously occupied by the G.E.C.; and at Monks Rd, Lincoln, two adjacent premises have been acquired.

Manchester Depot. Charles Churchill and Co. Ltd. have opened new branch showrooms, offices and warehouse at 2-12 The Crescent, Salford, Manchester 5. Telephone: Pendleton 1382.

S.A. Imports. The South African Board of Trade is considering an application for the increase of duty on imported electric light galleries from free and 15% *ad valorem*, to 15% and 20%, respectively.

New Factory. L. E. Simmonds Ltd. will add 6,000 sq ft to their manufacturing capacity when they take over, at the end of November, the new factory at Thetford. Company H.Q. remains at Byron Rd, Harrow.

BUSINESS PROSPECTS

Abingdon B.C. Tender: 35 flats, Vineyard. Architects: D. Page and Ptnrs, 28 Beaumont St, Oxford.

Alnwick. Remodelling of Duke's Grammar School planned by Northumberland C.C.

Atcham R.D.C. Tender: 19 bungalows and warden's house on each of Bayston Hill and Cross Houses housing sites. Engineer.

Bacup. Robert Wood and Sons, Lee Mill, Bacup, plan new Stacksteads factory.

Banstead U.D.C. Tender: 243 dwellings, Chapel Way area, Tadworth. Clerk.

Barnsley B.C. £2,750 scheme for modernising lifts at Town Hall.

Bathavon R.D.C. Tender: Eight houses, two-storey block of eight flats and warden's house, Combe Down, Bath. Architect.

Bedlington and Wallington B.C. Street lighting programme for lighting of 13 streets.

Belfast. Behr-Manning, Castlereagh Rd, plan factory extensions.

Biggleswade U.D.C. Tender: Section "A," 27 houses; and Section "B," 22 houses at London Rd housing site. Engineer.

Birmingham T.C. Tenders: Contract 700, eight two-storey dwellings, Starbank Rd, Hay Mills; Contract 709, 27 four-storey dwellings, Tessall La, Egghill La estate, Northfield; Contract 711, three shops, etc., Millpool Hill estate, Warstock; and Contract 742, 12 four-storey dwellings and shop, Deelands Rd, Rubery. Architect.—Contract 749, four children's homes and 15 two-storey dwellings' sites, Bartley Green and West Heath. Architect.—Welfare Committee plans multi-storey Handworth home.

Bolton. Corporation plans psycho-geriatric patients' hostel, Chorley New Rd.

Bootle B.C. Improved traffic signals planned at Balliol Rd/Hawthorne Rd and junction Stanley Rd/Merton Rd.

Bradford. Quadrex Nominees, W.1, promoters of £5 million development in city.

Brighouse. Smith Bulmer and Co. plan Branxholme Mills, Bailiff Bridge, factory extensions.

Burton-on-Trent. Health Committee plans residential home for 50 aged persons, Albury Hse site, Stapenhill Rd.

Caernarvonshire. R. Colwyn Foulkes, Merton Pl, Pwllycrochan Ave, Colwyn Bay, architect for £1 million improvements at Oakwood Park Hospital, Conway, for Welsh Hospital Board, Cardiff.

Canterbury. War Department plans £350,000 rebuilding of Hower Barracks.

Cardiff. Wm. Cowlin and Son, Penarth Rd, contractors for £200,000 building extensions at Royal Ordnance Factory for M. of Works.

Chelmsford R.D.C. Tender: Six bungalows and ten houses, Little Baddow. Housing and Estates Manager.

Chippenham. Wiltshire C.C. plans Marshfield Rd training centre and mental health hostel.

Consett. U.D.C. plans development of 70-acre Delves site as industrial estate.

Croydon. I.T.A., 14 Princes Gate, S.W.7, plan enlarged TV station with 500 ft tower at Beaulieu Heights, South Norwood Hill, S.E.

Cuckfield U.D.C. Tender: 60 houses, Ashenground Wood, Haywards Heath. Surveyor.

Dundee T.C. Tender: three houses, Dean Ave housing estate. Quantity Surveyor.

Durham. Clayton and Deas, High Row Chmbrs, Darlington, architects for junior and infants' school, Leasingthorne, for C.C. —Sir Basil Spence, 40 Moray Pl, Edinburgh, architect for £400,000 new women's college, St. Aidan's, New Elvet Hill, Durham City, for the University.

Enfield. Thorn Electrical Industries Ltd., Upper St. Martin's La, W.C.2, plan single-storey laboratory building, Southbury Rd, and canteen at Gt. Cambridge Rd.

E. Sussex C.C. Welfare Services Committee, Lewes, plans following old people's homes: Court Farm, Hove, 60 places; Lewes, 50 places; senior hostels at Mid-Sussex area, ten places, and S.W. coastal area, ten places; Mid-Sussex area, 50 places.

Frinton and Walton U.D.C. Scheme for lighting improvements in Frinton, £10,700.

Gateshead. Hadden and Hillman, Heaton Rd, Newcastle, plan 500 houses and shops at Chowdene Hall Farm.

Glasgow. Scottish Co-operative Wholesale Society, 95 Morrison St, C.5, plan seven-storey bank and drapery warehouse.—Western Hospital Board, 46 West Regent St, C.2, plan children's unit at Stobhill General Hospital.

Godalming B.C. Tender: 21 bungalows in terraces, Green La, Farncombe. Engineer.

Hedham. J. T. Bell and Sons, Market St Chmbrs, Newcastle, plan housing developments at Tynedale Gdns, Stocksfield.

Herne Bay U.D.C. Tender: 30 to 36 dwellings, rear Sussex Gdns. Architect: J. C. Clague, Lloyds Bank Chmbrs, High St.

Hexham. R.C. school planned for Northumberland C.C. Architect.

Hinckley. Amoa Chemical Co. plan extensions of their premises.

Houghton-le-Spring. Newrick and Blackbell, 58 John St, Sunderland, architects for 34 houses at Warden Grove for Isaac Berriman.

Hursley. I.B.M. Laboratories, W.1, plan factory block on site at Hursley Hse.

Ilford. Sir Robert Tasker and Ptnrs, 3 Field Court, Gray's Inn, W.C.1, architects for Commercial and Industrial Structures' workshop and offices, Woodford Ave.

Ipswich. E. Anglian Hospital Board, Cambridge, plan £125,000 boiler house, etc., Ipswich and East Suffolk Hospital.

Isle of Wight R.D.C. Tenders: (a) Two bungalows, Thorley St; and (b) two bungalows, Newchurch School.

Jarrow. Industrial Estate Management Corporation for England, Team Valley Estate, Gateshead, plan 40,000 sq ft factory on Simonside estate.

Kettering. Gollins, Melvin Ward and Ptnrs, 15 Manchester Sq, W.1, architects for £800,000 extensions to General Hospital.

Kidderminster R.D.C. Tender: 32 dwellings, Cookley, and 22 dwellings, Chaddesley Corbett. Architects: A. T. Butler and Ptnrs, 31 Priory St, Dudley.

Kiveton R.D.C. Tender: 56 houses, Red Hill site. Architect: B. D. Thompson, 102 Bridge St, Worksop.

Lisburn R.D.C. Tender: 36 dwellings on three sites at Finaghy, Belfast. Architect: H. McMordie, 29 Wellington Pl, Belfast 1.

Liverpool. Regional Hospital Board plan extensions to X-ray department at St. Helen's and extensions, etc., to operating theatre at Clatterbridge Hospital.

London. Kenneth Castiglione, 15 Colindale Ave, plan laboratory.—P. G. S. Fox, "Wyldes," North End, N.W.3, architect for Neuberger Products' factory extensions, Rookery Way.—H. Bramhill, 10 Gray's Inn Sq, W.C.1, architect for cold store and ancillary accommodation at 25 Wapping High St, E.1.—Stanley Peach and Ptnrs, 28 Eccleston Sq, S.W.1, architects for Saffron Hill/Kirkby St junction industrial building. —L. R. Bovingdon, 2 Yew Tree Rd, W.12, architect for Coronation Rd, N.W.10, factory planned by Fargo Properties.—C. W. Lowe, 7 St. Thomas St, S.E.1, architect for rebuilding of Bedford Steer End and Co.'s factory, Long La, S.E.1.—Hastie, Winch and Kelly, 1 Bentinck St, W.1, architects for £175,000 building extension in Croft St, S.E.8, for J. and H. Transport Services (Peckham).—Elliott, Cox and Ptnrs, 172 Buckingham Palace Rd, S.W.1, architects for A. Cohen and Co.'s extensions at Woolwich Arsenal Industrial estate, S.E.18.—L. A. Culliford and Ptnrs., architects, and Humphreys Ltd., Knightsbridge, S.W., are connected with *Daily Telegraph's* plan for extensions bounded by Little New St, New St Hill, Wine Office Court and Printer St.—Munby, Smith and Hampton, 46a King's Rd, S.W.3, architects for A. Gallenkamp and Co.'s Christopher St offices.

Londonderry. T.C. approved scheme for 500 houses.

Lowestoft B.C. Scheme planned for lighting Denes Oval buildings.—Birds Eye Foods Ltd., Hesketh Hse, Portman Sq, W.1, plan fish and poultry by-products plant on site at Wildes St for their associate company, Ocean Harvest.

Maidstone. Extensions to 1960-61 street lighting programme planned at £5,090, and further programme for improvements during 1961-62 at £18,010.—Wallis Gilbert and Ptnrs, 5 Cromwell Rd, S.W.7, architects for Alabaster Passmore and Sons' extensions.

Manchester T.C. Tender: 60 dwellings, Hazel Grove and Bramhall. Director of Housing.

Mansfield B.C. Tender: 25 dwellings, Crow Hill site. Documents from E. T. Crowe, Carr Bank, Mansfield.

Middlesbrough. P. R. Middleton and Ptnrs, 111 Albert Rd, architects for building developments in Linthorpe Rd for Blue Line Cars (Middlesbrough) Ltd.—Kitching and Co., 21 Albert Rd, architects for rebuilding and development of Devonport Hotel for J. Eadie Ltd.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Allied. B798,210. Class 7. Scrubbing, washing machines, etc. B798,211. Class 9. Apparatus, etc. Allied Ironfounders Ltd., 28 Brook St, W.1.

Autronic. 775,625. Class 9. Control switches incorporating automatically operated safety releasing devices. Autronic Developments Ltd., Crawley Rd, Newport Pagnell, Bucks.

Elgastat. 805,777. Class 9. Apparatus, etc. Elga Products Ltd., Lane End, Bucks.

Gus. Classes 7, 8, 9 and 11. Great Universal Stores Ltd., Devonshire St, Ardwick, Manchester.

Isoval. 800,783. Class 9. Apparatus, etc. Etablissements Merlin and Gevin, Rue Henri Tarze, Grenoble, France.

Kismatic. 807,042 and 3. Classes 7 and 8. Paint spraying apparatus, etc. Wm. Turner (Kismet) Ltd., Fenlake Wks, Fenlake Rd, Bedford.

Polyclad. B807,786. Class 9. Flexibles, wires, cables, etc. Concordia Electric Wire and Cable Co. Ltd., Trent Mills, Derwent St, Long Eaton, Nottingham.

Proxar. 737,007. Class 9. Apparatus, etc. Carl-Zeiss-Stiftung, Heidenheim an der Brenz, Württemberg, Germany.

Recomp. 807,023. Class 9. Computers, etc. North American Aviation Inc., International Airport, Los Angeles, U.S.A.

Remington. 788,892. Class 8. Shaving instruments, etc. Remington Rand Ltd., Commonwealth Hse, 1-19 New Oxford St, W.C.1.

Storador. 797,895. Class 11. Refrigerators, etc. Ada (Halifax) Ltd., West Mount Wks, Johnson St, Halifax.

Tom Thumb Candles. 806,594. Class 11. Lamps simulating candle flames, etc. A.E.I. Lamp and Lighting Co. Ltd., 33 Grosvenor Pl, S.W.1.

Tweeny Jet Waste. 795,294. Class 7. Machines for pulverising, pulping, etc. Haigh Eng. Ltd., Ross-on-Wye, Hereford.

Business Prospects—Continued

Newcastle. Barrett Sons and Ptnrs, 33 High Bridge, quantity surveyors for Regional Hospital Board's radiotherapy centre at General Hospital.—£142,979 development stage at Prudhoe and Monkton Hospital for Newcastle Hospital Board.

Peterlee. Development Corporation tender: 106 two-storey houses on Chapel Hill IV housing scheme. General Manager.

Portadown. Northern Ireland Housing Trust tender: 412 dwellings at Redmanville extension of Portadown. Offices of the Trust, 12 Hope St, Belfast.

Rotherham. B.T. Commission plans light industrial premises in Masborough area.

Rothwell U.D.C. Tender: Three blocks of four two-bedroom flats, Harrington Rd site. Surveyor.

Shipley U.D.C. Tender: Rochester St redevelopment, including 42 one-bedroom and 21 two-bedroom flats and bungalows. Surveyor.

Southwell R.D.C. Tender: 16 pairs dwellings and communal block at Crowpark Ave, Sutton-on-Trent. Architect.

Spennymoor. Durham Coal Board (No. 4 Area), Coundon, plan £100,000 offices covering 40,000 sq ft at Green La. Divisional Architect's Dept., 24 The Side, Newcastle.

Swansea B.C. Electrical installation planned at proposed primary school, Sketty Park. Architect.

S. Wales. Forth Chemicals Ltd., Bo'ness Rd, Grangemouth, Stirlingshire, plan £3 million plastics plant on site between Neath and Port Talbot.

Swinton. Manchester Hospital Board plans extensions to Royal Manchester Childrens' Hospital.

Taunton. H. S. W. Stone and Ptnrs, 20 The Crescent, architects for industrial site in Priorswood area for T. S. Penny (Property Development).

Tynemouth B.C. Scheme for automatic traffic signals at junction of Wallsend Rd and Station Rd, Percy Main.—Redevelopment scheme for shops and maisonnettes, etc., Front St, Cullercoats, planned. Engineer.

Wakefield. C.C.P. Holdings Ltd. plan development of Corporation's Kirkgate site.

Wallasey. Borough Architect to prepare plans for health clinic, Twickenham Drive.

Wednesbury. Clifford Products plan Brookside factory extensions.

Winchester T.C Tender: Eight dwellings and a shop in Canon St. Quantity surveyors: A. S. Wilson and Ptnrs, 8 Storey's Gate, London, S.W.1.—Pink and Arnold, Westgate Chmbrs, Winchester, surveyors for Southern Counties Agricultural Trading Society's new offices.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Millmans of Putney Ltd. Mr B. Rose, 14 Queen Victoria St, E.C.4, appointed liquidator at extraordinary general meeting on 11 Nov. for the purpose of voluntarily winding-up.

Lema Electric Co. Ltd. Mr B. Rose, 14 Queen Victoria St, E.C.4, appointed liquidator at extraordinary general meeting on 11 Nov. for the purpose of voluntarily winding-up.

Reeves Electrical and Radio Co. Ltd. Winding-up order dated 14 Nov. Electrahome Ltd. Mr R. A. Hawken, Bank Chmbrs, 1 John St, W.C.1, appointed liquidator at extraordinary general meeting on 15 Nov. for the purpose of voluntarily winding-up.

Astoria Electrics Ltd. Mr B. Goodwin, 111 Moorgate, E.C.2, appointed liquidator at extraordinary general meeting on 14 Nov.

Oliver Industries Ltd. Meeting of creditors to be held at Room 47, Winchester Hse, Old Broad St, E.C.2, on 9 Dec., at 10 a.m.

Friokold Ltd. Last day for receiving proofs for intended dividend: 7 Dec., to liquidator: F. M. Collins, Inveresk Hse, 346 Strand, W.C.2.

Ferris Domestic Appliances (Cardiff) Ltd. First meetings of creditors and contributories to be held at Official Receiver's Office, County Court Bldgs, Westgate St, Cardiff, on 2 Dec., at 3.15 and 3.45 p.m., respectively.

Partnerships Dissolved

Burley-in-Wharfedale. Partnership between J. F. and D. G. Roe, electrical contractors, carrying on business as Roe Bros., at Otley and Burley-in-Wharfedale, dissolved as from 1 Nov. All debts to be paid by D. G. Roe, 20 West View Ave, Burley-in-Wharfedale, who is carrying on the business.

Merstham. Partnership between J. R. Ward and K. C. Shallcross, radio, television and electrical engineers, carrying on business as Merstham Radio and Television Services, at 54 Nutfield Rd, dissolved as from 3 Sept. Debts to be paid by K. C. Shallcross, who is carrying on the business.

BANKRUPTCY ACTS

Receiving Orders

St. Albans. W. E. Thomas and R. C. Green, electrical appliance dealers, formerly carrying on business as Home Valet Service, at 17 High St, Hemel Hempstead, and as Home Appliance Specialists and Home Counties Electrical Services, at 15a High St, Hemel Hempstead. Receiving order dated 18 Nov.

Sheffield. F. C. Turner, domestic appliance dealer, electrical and motor engineer, formerly carrying on business as Ross Electrics, Ross Eng. and as Eros Security, at 112 Sepulchre Gate, 14 Bentinck St, 28 Springwell La, Balby, 18 South Parade and Cherry La, Marshgate, all at Doncaster; and at 127 Hessle Rd and 127 Spring Bank, Hull, at 2 Green St, Huddersfield, and at 9 Eldon Terr, Leeds 1. Receiving order dated 21 Nov.

Manchester. E. Humphreys, electrical dealer, a partner in the firm, J. and H. Supplies, of 8 Benchill Ave, Benchill, Wythenshawe, lately carrying on business at 466-468 Rochdale Rd, Harpurhey, Manchester. Receiving order dated 17 Nov.

First Meeting and Public Examination

Brighton. F. J. B. Pink, electrical and refrigeration engineer, lately carrying on business as Reliance Refrigeration Service Co., at Sherwood Wks, Sherwood Rd, Bognor. First meeting: 11 a.m., 1 Dec., at Official Receiver's Office, 8 Old Steine, Brighton; and public examination: 10.30 a.m., 27 Jan., at Court Hse, Church St, Brighton 1.

Appointment of Trustee

York. M. W. P. Walsh, electrical goods dealer, formerly carrying on business at 59 Holgate Rd. Mr R. W. Hellyer, Brotherton Chmbrs, Westgate, Leeds 1, appointed trustee as from 17 Nov.

Intended Dividend

Gt. Yarmouth. P. E. Pitchers, radio and electrical engineer, formerly carrying on business at 13 Tann La, Caister-on-Sea. Last day for receiving proofs for intended dividend: 2 Dec., to trustee: C. A. Taylor, Norfolk Hse, Exchange St, Norwich.

MEETINGS TO NOTE

THURSDAY, 1 DEC.

I.E.E. "Our Civic Lighting: Gloom or Gaiety?" W. R. Stevens and H. M. Ferguson; and "A Survey of Street Lighting and its Future," W. R. Stevens and H. M. Ferguson. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Southern). "Instrumentation of Nuclear Reactors." D. Harrison. South Dorset Technical College, Weymouth. 6.30 p.m.

I.E.E. (Hull). "Marine Electrical Practice on Cargo Liners." D. G. Robinson. Joint meeting with Graduate and Student Section. Lecture Theatre, Y.E.B. Offices, Ferensway, Hull. 6.30 p.m.

CHELMSFORD ENGINEERING SOCIETY. "The Raising of H.M. Submarine *Truculent*." Lt-Cdr L. Hackman. Hoffmann's Social Hall. 7.30 p.m.

INSTITUTION OF MECHANICAL ENGINEERS (Education Group). "Is Training in Industry Really Integrated with Academic Studies on Sandwich Courses in Colleges of Technology?" Birdcage Walk, S.W.1. 6 p.m.

I.E.S. (Nottingham). "The Eye and Artificial Lighting." W. J. Wellwood Ferguson. Electricity Centre, Carrinton St. 6 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (N. Western). "Industrial Television." I. M. Waters. Reynolds Hall, College of Technology, Manchester. 7 p.m.

BRITISH INSTITUTE OF MANAGEMENT. Conference: "The Importance of Engineering Services to Modern Management." Connaught Rooms, Gt. Queen St, W.C.2.

A.S.E.E. (Brighton, Hove and District). "Stage Lighting Presentation." F. E. Brown. New Imperial Hotel, First Ave, Hove. 7.30 p.m.

A.S.E.E. (Oxford and District). "Circuit and Equipment Applications of Transistors." Cockcroft Hall, Harwell. 5.45 p.m.

FRIDAY, 2 DEC.

I.E.E. (Medical Electronics Group). Discussion: "Telemetering Biological Data." Savoy Pl, W.C.2. 6 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Fawley). "Selection Design and Application of Automatic Control Valves." P. Stone. Admin. Bldg. Esso Refinery. 5.30 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (Computer Group). "Progress in Microminiature Circuit Techniques for Digital Computers." D. Roberts, D. S. Campbell and P. M. Thompson. London School of Hygiene and Tropical Medicine, Keppel St, W.C.1. 6.30 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (S. Midlands). "The Place of the Electric Rocket in Space Propulsion." W. A. S. Murray. North Gloucestershire Technical College, Cheltenham. 7 p.m.

PLASTICS INSTITUTE (N. West). "Hot Runner Moulds." W. G. Lucas. Textile Institute, 10 Blackfriars St, Manchester 3. 6.45 p.m.

A.S.E.E. (Liverpool and District). "An Approach to the Use of Electrical Units." D. Chalmers. Industrial Development Centre, M.A.N.W.E.B., Paradise St. 7.30 p.m.

A.S.E.E. (Stoke and Crewe). "Variable Speed A.C. Motors." J. C. H. Bone. Royal Hotel, Crewe. 7.30 p.m.

MONDAY, 5 DEC.

I.E.E. Discussion: "National Proving of Domestic Electrical Equipment." Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Mersey and N. Wales). "The Determination of the Electrical Characteristics of an Arc Furnace." J. Ravencroft. Royal Institution, Colquitt St, Liverpool. 6.30 p.m.

I.E.E. (S. Midlands). "Parametric Amplifiers." R. V. R. Carter and I. A. Bagnall. Winter Gardens, Gt. Malvern. 7.30 p.m.

I.E.E. (S. Midlands). "Radiocommunication in the Power Industry." E. H. Cox and R. E. Martin. College of Technology, Birmingham. 6.30 p.m.

I.E.E. (N.E. Measurement and Electronics). Lecture: "Radar Observations of Birds and 'Angels'." E. Eastwood. Rutherford College of Technology, Newcastle. 6.15 p.m.

I.E.E. (Maidstone). "Uses and Manufacture of M.I.C.C. Cable." G. E. D. Redman. Maidstone Technical College. 7 p.m.

N.E. ELECTRICAL CLUB. "Looking at Lighting." A. Wilcock. County Hotel, Neville St, Newcastle upon Tyne. 6.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (S. Yorkshire). "Instrumentation for Railway Research." P. H. Mansfield. University, St. George's Sq, Sheffield 1. 7 p.m.

I.E.S. (Leeds). Members' Night. Lighting installations by members of the Centre. British Lighting Council, 24 Aire St. 6.15 p.m.

I.E.S. (Newcastle). "Looking at Lighting." A. Wilcock. County Hotel. 6.30 p.m.

A.S.E.E. (Bolton). "Railway Electrification." Railway Hotel, Trinity St. 7.45 p.m.

A.S.E.E. (Essex). "Disregard of the I.E.E. Regulations." E. J. Sutton and H. C. Breeze. Angel Hotel, Ilford Broadway. 8.15 p.m.

A.S.E.E. (Leeds). "Lamps and Lighting." K. Havlor. Gt. Northern Hotel. 7.30 p.m.

A.S.E.E. (Sheffield). "Application of Electrical Control: Oil and Gas Burners." D. Stretton-Smith. Royal Victoria Hotel. 7.30 p.m.

Meetings to Note—continued

TUESDAY, 6 DEC.

I.E.E. (Measurement and Control Section). "A Universal Non-Linear Filter, Predictor and Simulator, which Optimises Itself by a Learning Process," Professor D. Gabor, W. P. L. Wilby and R. Woodcock. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Southern). "F.M./A.M. V.H.F. Portable Transistor Receivers," L. E. Jansson. The University, Southampton. 6.30 p.m.

I.E.E. (N. Midlands). "Thermistors—Their Theory, Manufacture and Application," R. W. A. Scarr and R. A. Setterington. Bradford Institute of Technology. 6.30 p.m.

I.E.E. (N.W. Utilisation Group). "Electrical Characteristics of the Argon Arc Welding Process," J. C. Needham and L. H. Orton. Engineers' Club, Manchester. 6.15 p.m.

I.E.E. (E. Anglia). "Engineering Aspects of Commercial Television Programme Presentation," T. C. Macnamara. Stuart Hall, Norwich. 7.30 p.m.

I.E.E. (Rugby Graduates and Students). "Automatic Electric Lifts," K. A. Yeomans and R. J. Bedford. Northampton meeting.

INSTITUTION OF PRODUCTION ENGINEERS (Southern). "Non-Destructive Testing as an Aid to Production," D. G. W. Claydon. Town Hall, Oxford. 7.30 p.m.

A.S.E.E. (W. London). "Railway Signalling," G. R. Kent. Windsor Castle Hotel, 134 King St, W.6. 7.45 p.m.

A.S.E.E. (Reading and Districts). "Fire Protection." "Marquis of Lorne," Friar St. 7.30 p.m.

WEDNESDAY, 7 DEC.

I.E.E. (Southern). "Radiocommunication in the Power Industry," E. H. Cox and R. E. Martin. South Eastern Electricity Board Office, 10 Queen's Gardens, Hove. 6.30 p.m.

I.E.E. (N.W. Electronics and Communications Group). Discussion: "New Semiconductor Devices." Engineers' Club, Manchester. 6.15 p.m.

I.E.E. (Tees-side). "The Logmotor—A Cylindrical Brushless Variable-Speed Induction Motor," Prof F. C. Williams, E. R. Laithwaite, J. F. Eastham and L. S. Piggott; and "Brushless Variable-Speed Induction Motors Using Phase-Shift Control," Prof F. C. Williams, E. R. Laithwaite, J. F. Eastham and W. Farrer. Cleveland Scientific and Technical Institution, Middlesbrough. 6.30 p.m.

I.E.E. (S. Midlands Graduates and Students). Joint meeting with University of Birmingham Electrical Engineering Society. Birmingham University. 6.30 p.m.

I.E.E. (London Graduates and Students). "Magnetic Amplifiers in Power Engineering," M. J. Pope. Medway College of Technology, Chatham, Kent. 7 p.m.

INSTITUTION OF MECHANICAL ENGINEEERS. Symposium on the Dounreay Fast Reactor. Birdcage Walk, S.W.1.

INSTITUTION OF PRODUCTION ENGINEERS (S. East). "A Progress Report on the Production Control by Computers," B. L. J. Hart. Old Ship Hotel, Brighton. 7 p.m.

MINISTRY OF WORKS. "The R.I.B.A. Form of Contract—Nominated Sub-contractors," I. N. Duncan Wallace, Y.M.C.A., Connaught Hall, Blackett St, Newcastle upon Tyne. 7.15 p.m.

I.E.S. (Edinburgh). "Lighting of Outdoor Industrial Plant," J. G. Holmes. Y.M.C.A. Social Room, 14 South St, St. Andrew St. 6.15 p.m.

I.E.S. (Swansea). "Lighting and Industry in the Soviet Union," E. H. Norgrove. Demonstration Theatre, S.W.E.B., Kingsway, Swansea. 6 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (N. Eastern). "Human Engineering," S. G. Ramsay. Institution of Mining and Mechanical Engineers, Neville Hall, Westgate Rd, Newcastle upon Tyne. 6 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (Radar Group). "Flight Evaluation of Airborne Electronic Equipment," H. G. Hinckley. London School of Hygiene and Tropical Medicine, Keppel St, W.C.1. 6.30 p.m.

I.E.E. (Sheffield Graduates and Students). "Noise with Particular Reference to Transformers," P. J. Bennett. College of Technology, Rotherham.

I.E.E. (Bristol Graduates and Students). "Ferrite Storage in Digital Computers," P. J. Commerford. Gloucester Technical College. 7 p.m.

A.S.E.E. (Halifax). "Design of Fittings," K. F. Haylor. Crown Hotel, Horton St. 7.45 p.m.

A.S.E.E. (N. London). "Control Systems on London Transport Signalling," G. R. Kent. Wood Green Civic Centre, Town Hall, N.22.

A.S.E.E. (S.E. London). "Coal Mines and Electricity," P. W. Wyke. Eltham Green School, Queenscroft Rd, S.E.9. 7.45 p.m.

A.S.E.E. (Preston). "Ernie," C. Ashworth. R.A.F.A. Club, East View. 7.30 p.m.

I.E.E. (S.E. Scotland). Joint meeting with Institutions of Civil and Structural Engineers: "Zambesi Hydro-electric Development at Kariba—First Stage," T. A. L. Paton and J. L. Blackburn. North British Hotel, Edinburgh. 6 p.m.

THURSDAY, 8 DEC.

I.E.E. (Utilisation Section). "The Determination of the Electrical Characteristics of an Arc Furnace," J. Ravenscroft. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (W. Wales). Informal meeting. S. Wales Electricity Board, The Kingsway, Swansea. 6 p.m.

I.E.E. (Cambridge Electronics and Measurement Group). "Recent Progress in Microwave Valves," A. H. W. Beck. Cavendish Laboratory. 8 p.m.

I.E.E. (N. Scotland). "Induction Generators for Electricity Supply," C. L. C. Allan. Electrical Engineering Dept., Queen's College, Dundee. 7 p.m.

I.E.E. (N. Staffs Graduates and Students). "A Visit to the U.S.S.R.", A. Asbury, T. E. Calverley and D. Kilby, Stafford.

I.E.E. (N.W. Graduates and Students). "Space Heating," A. Shorrock. Engineers' Club, Manchester. 7 p.m.

I.E.E. (Southern Graduates and Students). "Power From the Atom," K. W. Huddart. Portsmouth College of Technology. 6.30 p.m.

I.E.E. Faraday Lecture: "Transistors and All That," L. J. Davies. Colston Hall, Bristol. 6.45 p.m.

INSTITUTION OF PLANT ENGINEERS (N. East). "Fine Measurement," J. R. Adams. Roadway Hse, Oxford St, Newcastle upon Tyne. 7 p.m.

PLASTICS INSTITUTE (Southern). "*Which?*" a speaker from Consumers' Association. Chemistry Dept., University of Southampton. 7.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Liverpool). "Statistics," J. R. Judd. M.A.N.W.E.B. Industrial Development Centre. 7 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Tees-side). "Chromatography," T. B. Kent; and "Practical Aspects of Plant Measurements," M. S. Beck. Cleveland Scientific and Technical Institute, Corporation Rd, Middlesbrough. 7.30 p.m.

I.E.S. (Glasgow). "Lighting of Outdoor Industrial Plant," J. G. Holmes. Joint meeting with A.S.E.E. British Lighting Council, 29 St. Vincent Pl. 6.30 p.m.

I.E.S. (Manchester). "Ship Lighting," J. T. Grundy and C. H. Vaughan. Demonstration Theatre of N.W.E.B., Town Hall Extension. 6 p.m.

A.S.E.E. (Bradford and District). "Miniature Circuit-breakers," S. W. Hornsey. Midland Hotel. 7.30 p.m.

A.S.E.E. (S.W. London). "Electric Floor-warming," J. Cook; and "Instrument Transformers," R. Halloway. Prince of Wales Hotel, S.W.19. 8.30 p.m.

FRIDAY, 9 DEC.

I.E.E. (N. Eastern). "The Shielding of Overhead Lines Against Lightning," J. H. Grindley. Carlisle Technical College. 7 p.m.

I.E.E. (N. Scotland). "Induction Generators for Electricity Supply," C. L. C. Allan. Robert Gordon's Technical College, Aberdeen. 7.30 p.m.

E.P.E.A. (Meter Engineers' Technical Group). "Electronics and Metering," A. J. Baggott. Caxton Hall, Westminster, S.W.1. 6.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Midlands). "Training of Instrument Engineers," Prof J. E. Parton. Lecture Theatre of the Byng Kendrick Suite, at the Gosta Green College of Technology, Aston St, Birmingham. 7 p.m.

MONDAY, 12 DEC.

I.E.E. (Electronics and Communication Section). "Topology Concepts in Network Theory," P. R. Bryant. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Western). "Engineering Education at the Technical Universities in Western Germany," D. B. Welbourn, Professor D. B. Spalding and G. L. Ashdown. Bristol University. 6 p.m.

I.E.E. (N. Staffs). "Recent Developments in Colour Television," I. J. P. James. Duncan Hall, Stone. 7 p.m.

I.E.E. (N. Ireland). "Pumped Storage," R. W. Mountain. Joint meeting with Northern Ireland Association of the Institution of Civil Engineers. Civil Eng. Dept., David Keir Bldg, Queen's University, Belfast. 6.30 p.m.

I.E.E. (N. Eastern). Lecture: "Street Lighting," W. R. Stevens and H. M. Ferguson. Supported by their paper entitled "A Survey of Street Lighting and its Future." Neville Hall, Westgate Rd, Newcastle upon Tyne. 6.15 p.m.

I.E.E. (Mersey and N. Wales). "The Potentialities of Artificial Earth Satellites for Radiocommunication," W. J. Bray. Town Hall, Chester. 6.30 p.m.

BIRMINGHAM ELECTRIC CLUB. "Subscriber Trunk Dialling," H. E. Francis. Grand Hotel. 6.15 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Manchester). "History of Pneumatic Control," G. E. Twist. College of Science and Technology, Sackville St. 6.45 p.m.

I.E.S. (Leicester). "Stage Lighting," E. E. Faraday and W. J. Furse. Nottingham. 6.15 p.m.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

British Electronic Industries Ltd., Radio Wks, St. Andrews Rd, Cambridge. To acquire for the purpose of amalgamation all or any of the shares (or the stock representing the same) of Pye Ltd. and E. K. Cole Ltd. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Charles O. Stanley and Eric K. Cole.

Cox and Rawlings Ltd., 44 Arwenack St, Falmouth, Cornwall. Manufacturers of and dealers in domestic, household and general electrical and other equipment, etc. Nom. cap.: £2,000. Dirs.: Leslie J. H. S. Cox, Philip I. Rawlings and Wm. D. Welch.

W. S. L. Davidson Ltd., 167 Tankerton Rd, Whitstable. Electrical engineers, etc. Nom. cap.: £200. Dirs.: Dorothy B. Styles and Wm. S. L. Davidson.

Euphonic Electrical Co. Ltd., 57a High Rd, Ilford. Nom. cap.: £100. Dirs.: Reginald A. Hampton and Kurt Taussig.

C. Freestone and Sons (Windsor) Ltd., 93 Clewer Hill Rd, Windsor, Berks. Engineers (electrical) and contractors, etc. Nom. cap.: £1,000. Dirs.: Cecil A. Freestone and Mrs R. M. Freestone.

Gordon Mustoe Ltd., 5 Tivoli Pl, Cheltenham, Glos. Manufacturers of and dealers in vacuum cleaners, etc. Nom. cap.: £100. Dirs.: Gordon F. A. Mustoe and Mrs M. C. Mustoe.

Haffenden-Richborough Ltd., Ridgeford Hse, 9 Clarges St, W.1. Nom. cap.: £100. Manufacturers of and dealers in rubber and plastics goods and to co-ordinate the group of companies comprising W. W. Haffenden Ltd., Richborough Rubber Wks Ltd, Sandwich Engineering Co. Ltd., and the subsidiaries thereof, etc. Dirs.: not named. Subs.: Wallace W. Haffenden and Trevor W. Haffenden.

R. Howe (Electrical) Ltd. To take over business of an electrical contractor carried on at Stamford St, Ashton under Lyne, by Ronald Howe, etc. Nom. cap.: £1,000. Dirs.: Ronald Howe and Doris C. Howe. Subs.: Harry Butterworth, 16 Crosley Rd, Radcliffe, nr. Manchester, and Joseph W. Haywood, 198 Parkhills Rd, Bury.

Hurst and Francis Ltd., 5 Lansdowne Sq, Gravesend. Electrical engineers, etc. Nom. cap.: £100. Dirs.: Albert Francis and Dennis A. Hurst.

J. and E. Distributors Ltd. Distributors and manufacturers of and dealers in motor car lamps, electric bulbs, etc. Nom. cap.: £100. Dirs.: John Wiltshire, 3 Harewood Rd, S.W.19, and Frederick E. Wiltshire, 2 Hambledon Rd, S.W.18.

Ringwood Electrical Co. Ltd., 24 Market Pl, Ringwood, Hants. Nom. cap.: £1,000. Dirs.: Frederick T. Evans and Peter E. D. Allum.

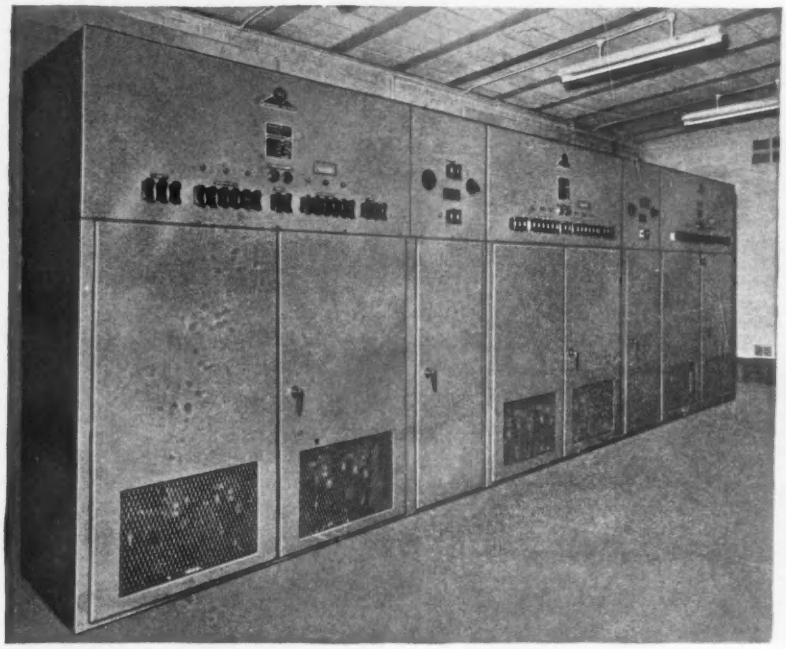
K. J. Shorey Ltd., 88 Ingleboro Dr, Riddlesdown, Purley. Manufacturers of and dealers in vacuum cleaners, etc. Nom cap.: £1,000. Dirs.: Kenneth J. Shorey and Norma Shorey.

Dick Vernon Ltd., 702 London Rd, North Cheam, Surrey. Manufacturers of and dealers in artificial lighting apparatus, etc. Nom. cap.: £1,000. Dirs.: Gerald J. Nash, Harry E. Nash and Peter Sherriff.

Williams Electrical (Sheffield) Ltd., 60 Barber Rd, Sheffield 10. Nom. cap.: £1,000. Permanent dirs.: Thomas Williams and Colin Williams.

Wilmslow Electrical Co. Ltd., 11 Peter St, Manchester 2. Nom. cap.: £100. Dirs.: Harold Bristow and Roy Waring.

Woodwards (Electric) Ltd., 494 Fulwood Rd, Sheffield 10. Nom. cap.: £5,000. Dirs.: John Woodward and Mrs Marion Woodward.



A 1300 kW bank of Hewittic Germanium Rectifiers installed in the Shipyard of Messrs. Cammell Laird & Co. (S & E) Ltd., Birkenhead, for providing D.C. for shore to ship supply.

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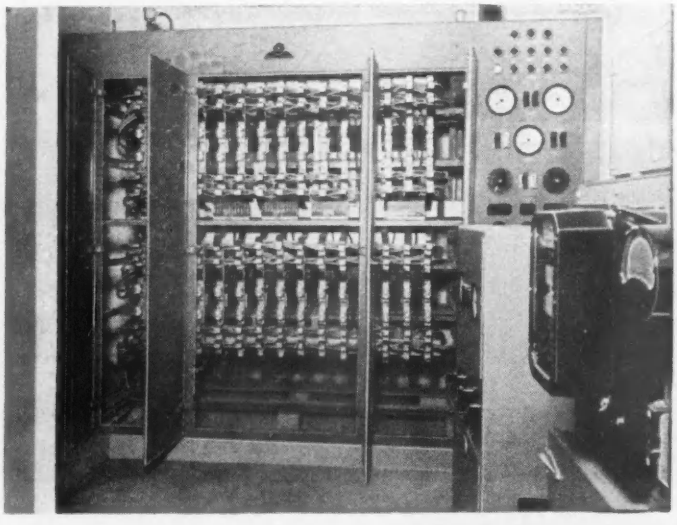

A 6000 amp Hewittic Water-cooled Germanium rectifier providing a continuous output at 100 volts D.C. for an electrochemical process at the Luton works of Laporte Industries Ltd.

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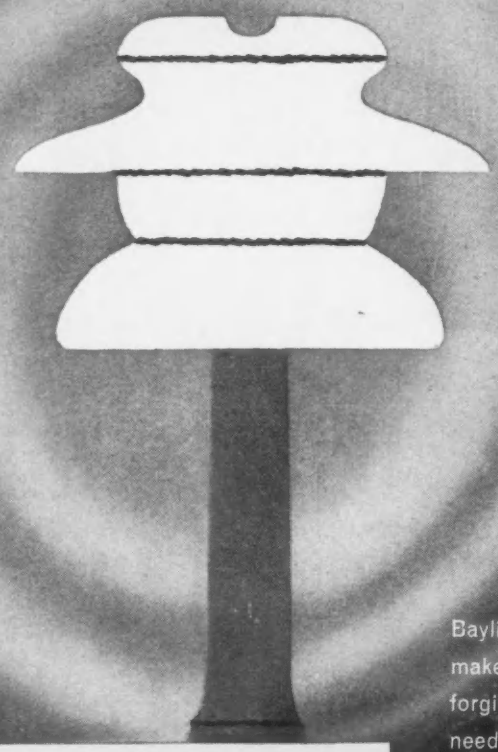

Bayliss, Jones and Bayliss make all the galvanised forgings and steelwork needed for safe, efficient transmission lines—whether it's a local distribution circuit or a high voltage network—and their equipment is used by Electricity Authorities all over the world. *Most standard items can be delivered from stock.*

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CLASSIFIED ADVERTISEMENTS

TENDERS INVITED

BOROUGH OF EALING

RENEWAL OF ELECTRICAL INSTALLATION AT ST. ANN'S SECONDARY GIRLS' SCHOOL SPRINGFIELD RD, W.7

TENDERS are invited for the above-mentioned work. Specification and Tender from the Borough Engineer, Town Hall, Ealing, W.5, on receipt of deposit of £1, returnable on receipt of bona fide Tender. Closing date: 22 Dec., 1960.

E. J. COPE-BROWN,
Town Clerk.
(T 41)

COUNTY BOROUGH OF SOUTHAMPTON

INVITES from Electrical Contractors: (a) Tenders for renewal of electrical installation at Millbrook Secondary Boys' School, (b) quotations for electrical installation at (new) Glen Eyre Secondary Boys' School. Forms and particulars from Borough Architect on written application (stating which of the above is required) by 5 Dec., 1960. R.I.B.A. Contract plus Supplementary Conditions available for inspection. Tender to Town Clerk, Civic Centre, Southampton, by 10 a.m., 20 Dec., 1960. (T 44)

APPOINTMENTS VACANT

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SENIOR INSTRUCTOR (SALES)

REQUIRED at the Board's Sales Training Centre, at present located at Wallasey, Cheshire.

Salary within range £1,020/£1,140 per annum (N.J.C. Grade 5).

The person appointed will be responsible to the Education and Training Officer for the administration and control of the Training Centre, and will be required to give instruction in subjects applicable to the training of the Board's Service Centre personnel.

Previous experience in a similar capacity and/or teaching experience would be an advantage.

Appointment subject to medical examination. Pension Scheme.

Applications in writing, giving relevant information, should be forwarded to the Establishments Officer, M.A.N.W.E.B., Love La, Liverpool 3.

Closing date: 12 Dec., 1960. (T 35)

CENTRAL ELECTRICITY GENERATING BOARD
South Eastern Division

NORTHFLEET POWER STATION
Vacancy No. 17B/60T.
ASSISTANT ENGINEERS (OPERATION)

REQUIRED. Candidate must be prepared to do relief and shift work when required. Experience with modern generating plant would be advantageous.

Salary: Class M, Grade 12, £1,165/£1,295 per annum, including London Allowance, plus 10% shift allowance when applicable.

Applications giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Northfleet Power Station, Crete Hall Rd, Northfleet, Kent, to arrive by 12 Dec., 1960.

W. H. DUNKLEY,
Divisional Controller.
(T 55)

CENTRAL ELECTRICITY GENERATING BOARD
East Midlands Division

GENERAL ASSISTANT ENGINEER
DRAKELOW POWER STATION
Vacancy No. 261/60.

APPLICATIONS are invited for the position of General Assistant Engineer at Drakelow Power Station, near Burton-on-Trent.

The successful applicant will be given opportunities to obtain experience in all sections of a power station.

Preference will be given to candidates who hold the Higher National Certificate or who are at present pursuing a course of study with the object of obtaining this or a similar qualification.

The salary during the initial training period will depend on qualifications and knowledge, and will be within the range £625/£805 per annum of the National Joint Board Agreement.

Closing date for receipt of applications: 10 Dec., 1960.

GENERAL ASSISTANT ENGINEERS
CASTLE DONINGTON POWER STATION
Vacancy No. 263/60.

Applications are invited for the positions of General Assistant Engineers at Castle Donington Power Station, near Derby.

Duties will include operation, planning and general plant investigation work.

Applicants should have had experience in power stations or have completed an engineering apprenticeship.

The salary during the initial training period will depend on qualifications and knowledge and will be within the range £625/£805 per annum of the National Joint Board Agreement.

Closing date for receipt of applications: 10 Dec., 1960.

ASSISTANT SHIFT CHARGE ENGINEER
NORTHAMPTON POWER STATION
Vacancy No. 265/60.

Applications are invited for the position of Assistant Shift Charge Engineer at Northampton Power Station, Nunn Mills Rd, Northampton.

Candidates should have sound technical training and practical power station experience in the operation of steam raising and generating plant, main and auxiliary switchgear.

Salary will be in accordance with Class G, Grade 9 (£965/£1,090 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 12 Dec., 1960.

GENERAL ASSISTANT ENGINEER
HIGH MARNHAM POWER STATION
Vacancy No. 266/60.

Applications are invited for the position of General Assistant Engineer at High Marnham Power Station, near Newark, Notts.

Applicants should hold the Ordinary National Certificate in Mechanical or Electrical Engineering. There are good opportunities for keen engineers who are willing to study new plant and methods.

The salary during the initial training period will depend on qualifications and knowledge and will be within the range £625/£805 per annum of the National Joint Board Agreement.

Closing date for receipt of applications: 16 Dec., 1960.

These appointments will be pensionable within the terms and conditions of the

continued in next column

continued from previous column

Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Station Superintendent concerned and should be returned to him by the date stated.

ASSISTANT CHEMIST
DIVISIONAL LABORATORY
Vacancy No. 267/60.

Applications are invited for the position of Assistant Chemist in the Divisional Laboratory at North Wilford Power Station, Queens Dr, Nottingham.

Candidates should be capable of initiating and leading investigations into such topics as air pollution, river pollution, industrial water treatment, analytical method development, and should have a sound knowledge of inorganic analysis.

Candidates should hold a degree or equivalent professional qualification. Previous power station experience is advantageous although not essential.

Salary will be in accordance with Class BX, Grade 8 (£1,105/£1,410 per annum) of the National Joint Board Agreement, and the position will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned not later than 31 Dec., 1960.

O. S. WOODS,
Divisional Controller.
(T 66)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD
Sub-Area Accountant, Chester

APPLICATIONS are invited from experienced qualified accountants for appointment as

ACCOUNTANT

to the Board's No. 3 Sub-Area covering Chester and Wirral, and based on Chester. The post will become vacant in April, 1961.

Salary within range £2,170/£2,380 per annum (N.J.M. Grade 5, Class C).

Applicants should have had a wide financial experience with responsibility for the control of staff. Previous service with a Public Utility undertaking would be advantageous. The duties will include control of office staff dealing with billing, cash collection and banking, and cost and stores accounting, required to deal with 170,000 electricity consumers.

Appointment subject to medical examination. Sick pay, pension and family provision schemes.

Applications, endorsed "Sub - Area Accountant," should be sent to the Secretary of the Board, Electricity Hse, Love La, Liverpool 3. Closing date: 12 Dec., 1960. (T 68)

SOUTHERN ELECTRICITY BOARD

ASSISTANT ENGINEER
(MAINTENANCE AND OPERATION)

NEWBURY District of No. 2 (Newbury) Sub-Area. Salary will be in accordance with Class F, Grade 9 (£890/£1,015 p.a.). N.J.B. Conditions of Service.

The duties of the post will be to assist with the maintenance and operation of H.V. and L.V. distribution mains and substations and with minor construction work. A technical training to H.N.C. standard and experience of similar work are required. A regular user's car allowance will be available.

The successful candidate for the appointment will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him, quoting Z.1253, not later than 12 Dec., 1960. (T 46)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 40s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

THE NORTH WESTERN ELECTRICITY BOARD

CHARGEHAND JOINTER (E.H.T.)
SUB-AREA JOINTING SCHOOL, FARNWORTH

THE duties will be to train suitable manual workers in jointing all types of cables up to 11 kV and also to supervise jointers in the field engaged on jointing cables up to 33 kV.

Rate of pay: 66·75d per hour, plus 5·25d per hour for chargehand duties. N.J.I.C. conditions.

Written applications to the Manager, No. 2 Sub-Area, The North Western Electricity Board, 2 St. George's Rd, Bolton, by 12 Dec., 1960.

FOURTH ASSISTANT ENGINEER
(POWER SALES AND CONTRACTING)
SUB-AREA COMMERCIAL DEPARTMENT
OLDHAM

Applicants should have had a sound training in electrical work and have made progress in a course of study leading to the H.N.C. in Electrical Engineering. The successful candidate will be required to assist in the preparation of schemes for electrification of industrial premises and for building heating.

Salary Scale: £965/£1,090 p.a. Grade L.13. N.J.B. conditions.

Applications on forms to be obtained from the Manager, No. 3 Sub-Area, The North Western Electricity Board, Union St, Oldham, and returned to him by 12 Dec., 1960.

FOURTH ASSISTANT DISTRICT ENGINEER
BURNLEY DISTRICT

The duties will include assistance in the operation, maintenance and construction of substations and H.V. and L.V. underground and overhead mains, fault location and the general maintenance of supply in the District. The successful applicant will be required to undertake standby duties.

Preference will be given to applicants who hold the H.N.C. in Electrical Engineering.

Salary Scale: £890/£1,015 p.a. Grade H.11. N.J.B. conditions.

Applications on forms to be obtained from the Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee St, Blackburn, and returned to him by 12 Dec., 1960. (T 33)

KENYA

Ministry of Works

ELECTRICAL ENGINEER

QUALIFICATIONS: Candidates aged 26-45) must be A.M.I.E.E. or Grad.I.E.E. and have relevant experience.

Duties: To design electrical installations in public institutions, airports and housing.

Terms of appointment: On contract for one tour of 24-45 months with salary according to experience in scale £1,194/£1,863 p.a. (at present under review) and 13½% gratuity. Free passages. Generous leave. Tax at local rates.

Apply Director of Recruitment, Colonial Office, London S.W.1. Give full name, age and brief details of qualifications and experience, quoting BCD 112/7/027/D10. (T 21)

NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE BURTON STREET, NOTTINGHAM

Principal:
D. A. R. Clark, M.Sc. (Tech.), M.I.Mech.E.

APPLICATIONS are invited for the following posts:

LECTURER IN ELECTRICAL MACHINES
ASSISTANT LECTURER GRADE B IN RADIO AND TELEVISION SERVICING

Salaries in accordance with the Burnham Technical Scale as follows:

Lecturer: £1,370 x £35—£1,550 per annum. A salary above the minimum will be paid in approved cases.

Assistant Grade B: £700 x £27 10s—£1,150 per annum, plus additions for qualifications and training. Commencing salary according to previous experience.

Research encouraged. Facilities and equipment available.

Further particulars and form of application may be obtained from the Principal to whom completed forms should be returned not later than 17 Dec., 1960. (T 45)

REPUBLIC OF THE SUDAN

APPLICATIONS are invited to fill the post of

AREA ELECTRICAL ENGINEER

Blue Nile Area, with the Central Electricity and Water Administration, Sudan.

Applicants should hold a University Degree in Engineering or be Corporate Members of the Institution of Electrical Engineers. They should have had considerable experience in the operation and maintenance of distribution systems of up to 11,000 volts. Experience on high voltage transmission lines would be of considerable advantage.

Salary offered will be in the range £S.1,750/£S.2,125 per annum, plus a variable cost of living allowance which at present amounts to £S.187 per annum. An initial kit allowance of £S.50 is payable (£S.1 = £1 0s 6d).

Furnished accommodation is available at a rent of approximately £S.170 per annum. Free medical treatment for official and his family.

Free air passages to official's home country for leave which is granted at the rate of 82 days per annum after the first 18 months.

Appointment will be on contract for five years including a 12 months' probationary period. A bonus of 10% of basic salary earned will be paid at the end of the contract.

Application should be made in the first instance, stating age, qualifications and experience and submitting copies of recent testimonials, to the Appointments Section, Sudan Embassy, 3 Cleveland Row, St. James's, London S.W.1.

Closing date: 15 Dec., 1960. (T 22)

CENTRAL ELECTRICITY GENERATING BOARD

ASSISTANT ELECTRICAL ENGINEER
(TECHNICAL SERVICES)

REQUIRED at the Central Electricity Research Laboratories, Leatherhead, Surrey.

The successful applicant will assist in the supervision and organisation of the electrical installation and maintenance of 11 and 33 kV and 230/400 V distribution networks and the control gear and power wiring required in connection with experimental rigs.

Candidates, preferably with H.N.C. in Electrical Engineering, or an equivalent qualification, should have first class experience of this type of work, preferably with knowledge of the Distribution Safety Rules.

Salary within the range £715/£1,015 p.a.

Applications stating age, qualifications, experience, present position and salary to the Personnel Officer, 24-30 Holborn, London E.C.1, by 13 Dec. Envelopes should be marked "Confidential Ref. ET/422." (T 39)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Edinburgh and Borders Area

SECOND ASSISTANT DISTRICT ENGINEER
EDINBURGH WEST DISTRICT

SALARY: N.J.B., Schedule A, Class G, Grade 7, Salary Scale No. 9, £1,115/£1,245 p.a.

Applicants should have a sound training and subsequent experience with H.V. and L.V. underground distribution systems, including the operation and maintenance of H.V. and L.V. switchgear and a knowledge of protective gear and fault location. They should also possess a National Certificate in Electrical Engineering or an equivalent qualification.

Conditions of service will be in accordance with the N.J.B. Agreement. The successful candidate, subject to satisfactory evidence of health, will require to become a contributor to the Board's Superannuation Scheme. He will require to reside within a reasonable distance of the District Office.

Applications, on the standard form, obtainable from the undersigned or any other Area Manager, should be submitted not later than 16 Dec.

C. H. A. COLLYNS,
Manager.

52 Melville St,
Edinburgh 3.
21 Nov., 1960. (T 32)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SENIOR ASSISTANT COMMERCIAL ENGINEER
(INDUSTRIAL DEVELOPMENT)

REQUIRED at No. 1 Sub-Area Headquarters, Liverpool. Salary within the range £1,920/£2,085 per annum (N.J.B. M/4).

Applicants should have wide experience in the Electricity Supply Industry, and be capable of advising on and negotiating major industrial supplies. Duties will include the development of industrial applications of electricity, preparation of estimates for major contracting works and the administrative work connected with industrial supplies. Technical qualifications essential.

Appointment subject to medical examination. Pension Scheme.

Special application forms, obtainable from the Manager, No. 1 Sub-Area, 24 Hatton Garden, Liverpool 3, should be completed and returned not later than 16 Dec., 1960. (T 69)

THE SOUTH WALES ELECTRICITY BOARD

ASSISTANT ENGINEER

APPLICATIONS are invited for the position of ASSISTANT ENGINEER in the Neath District of the Swansea and West Central Area.

The successful applicant will be required to undertake engineering duties of a general nature. Extensive development is being carried out within the District and the post will provide excellent opportunities to a qualified Electrical Engineer. Candidates without operational experience in the distribution of electricity are not debarred from applying.

Salary: N.J.B. Class F, Grade 11, Scale 4 (£765/£870).

Applications stating age, present position, present salary, qualifications and experience, should be addressed to G. R. T. Edwards, B.SC., M.I.E.E., M.AM.I.E.E., Manager, Swansea and West Central Area, 29 Ystrad Rd, Swansea Industrial Estate, Swansea, to arrive not later than 17 Dec., 1960. Please quote reference 212/60/ET, endorsing envelope "ASSISTANT ENGINEER."

R. G. WILLIAMS,
Secretary.
(T 57)

MIDLANDS ELECTRICITY BOARD

SECOND ASSISTANT DISTRICT ENGINEER

REQUIRED in the Banbury District of the Worcester and District Sub-Area.

Duties involve all branches of distribution work including construction, operation and maintenance of high and low voltage underground and overhead systems and substations. Technical qualifications desirable.

Salary: £965/£1,090 per annum (N.J.B. Grade E.7). Superannuable.

Apply, by letter, within 14 days, stating age, experience, present position and salary to Mr J. Pearson Smith, District Manager, Midlands Electricity Board, 15-17 Bridge St, Banbury, Oxon.

F. W. CATER,
Secretary.
(T 54)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

SOUTH EASTERN ELECTRICITY BOARD

ENGINEERING Vacancies in the Engineer's Department at Surrey Sub-Area Headquarters, Dorking.

THIRD ASSISTANT ENGINEERS (TWO) (CONSTRUCTION)

Salary: £1,190/£1,325 p.a. on N.J.B. Class L, Grade 10. Superannuable. Duties principally to organise and supervise construction works in the sub-area 33 kV transmission system, both underground and overhead, including substations.

THIRD ASSISTANT ENGINEER (PLANNING AND DEVELOPMENT)

Salary: £1,190/£1,325 p.a. on N.J.B. Class L, Grade 10. Superannuable. Duties will be to assist in the preparation of schemes and estimates for extensions of, and reinforcement to, underground and overhead networks up to and including 33 kV.

FOURTH ASSISTANT ENGINEER (OPERATION AND MAINTENANCE)

Salary: £965/£1,090 p.a. on N.J.B. Class L, Grade 13. Superannuable. Duties will be chiefly concerned with plant maintenance and the testing and commissioning of system protection on networks up to and including 33 kV. A particular knowledge of, or interest in, system protection would be an advantage.

Applicants should be of at least H.N.C. standard; they should indicate the particular post applied for and should have experience appropriate to that post. The appointments offer opportunity for work in a rapidly expanding area on the outskirts of London supplying 295,000 consumers and sales amounting to 1,207 million units per annum. Consideration will be given to private car allowance (excluding the Planning and Development post) and to assistance for house purchase in appropriate circumstances. Applications quoting ET and naming two referees on forms from Surrey Engineer, Seeboard, Rough Rew, Ridgeway Rd, Dorking, by 14 Dec., 1960.

NOTE: Applications for the construction and planning and development posts previously advertised in September will be considered and need not be resubmitted.

DISTRICT SENIOR COMMERCIAL ASSISTANT (SALES)
GUILDFORD DISTRICT

Salary: £1,150 × £30—£1,240 per annum under N.J.C. Grade 6; superannuable. The successful applicant will be required to promote and develop the sale of domestic and commercial electrical appliances and must have initiative and a keen sales ability. The duties will include the efficient operation of the district showrooms, the supervision of staff, the control of stock and the direction of sales campaigns, exhibitions and demonstrations. He will also be required to give advice on supply matters, tariffs, and installations for domestic and small commercial consumers.

Applications quoting ET on forms from District Manager, Seeboard, Woodbridge Rd, Guildford, by 14 Dec., 1960.

ASSISTANT ENGINEER
MEDWAY DISTRICT

Salary: £825/£940 per annum under N.J.B. Class G, Grade 11 (Scale 5). The post, which is superannuable, is in a district with a considerable amount of varied industry, in addition to domestic and commercial loads. Candidates should preferably hold the H.N.C. or equivalent, and practical experience in the operation, maintenance and construction of 11 kV and medium voltage underground and overhead systems. Knowledge of the preparation of extension and reinforcement schemes will be an advantage.

Applications quoting ET and naming two referees to District Manager, Seeboard, Gardiner Street, Gillingham, Kent, by 14 Dec., 1960.

ASSISTANT DISTRICT COMMERCIAL ENGINEER
HASTINGS DISTRICT

Salary: £825/£940 under N.J.C. Class F, Grade 10. The candidate should have experience in consumer service including the supervision of staff employed on main-

continued in next column

continued from previous column

tenance and repair work both on consumers' premises and in the workshops. A good knowledge of electrical apparatus and appliances is required together with the ability to prepare estimates and conduct correspondence and negotiations with consumers and manufacturers. Experience on the practical aspects of voltage standardisation at consumers' premises is desirable. Possession of technical qualifications would be an advantage.

Applications quoting ET and naming two referees to District Manager, Seeboard, 12-13 York Bldgs, Hastings, by 14 Dec., 1960.

ASSISTANT DISTRICT COMMERCIAL ENGINEER (CONTRACTING AND CONSUMERS' SERVICE)
HASTINGS DISTRICT

Salary: £1,040/£1,165 under N.J.B. Class F, Grade 7. Superannuable. The candidate appointed will be responsible to the district commercial engineer for electrical installation contracting and consumer service work throughout the district. The duties will include the preparation of estimates and schemes for all types of installation and the applicant should have the ability and initiative to develop the contracting activities by contacting local authorities, builders and architects. Included in the duties is the control of consumer service work both on consumers' premises and in the workshops and a good knowledge of electrical apparatus and appliances is required. The possession of the H.N.C. in electrical engineering would be an advantage.

Applications quoting ET and naming two referees to District Manager, Seeboard 12-13 York Bldgs, Hastings, by 14 Dec., 1960.

FIRST ASSISTANT COMMERCIAL ENGINEER
TWICKENHAM AND RICHMOND DISTRICT

Salary scale at present N.J.B. Class F, Grade 5, £1,190/£1,325 per annum, plus London Allowance, with progression to Grade 4 (maximum salary £1,410) subject to satisfactory service. (Re-classification to Class G anticipated in 1961.) Successful candidate will be responsible to the district commercial engineer and will be required to assist with tariff negotiations, sales activities, contracting, public lighting and general load development. Applicants must have suitable experience and should preferably possess a H.N.C. in electrical engineering or its equivalent. Consideration will be given to a private car allowance.

Applications quoting ET on forms from District Manager, Seeboard, 42 York St, Twickenham, Middlesex, by 14 Dec., 1960.

GEORGE WRAY,
Secretary.
(T 67)

FEDERATION OF RHODESIA AND NYASALAND
Federal Power Board. Staff Appointments

APPLICATIONS are invited for the post of:

SENIOR ASSISTANT COMMUNICATIONS ENGINEER—SALARY: £2,150 P.A.

Applicants should be fully qualified and thoroughly experienced in all aspects of the telecommunications work as applied to power system requirements.

The duties of the post will be connected with the commissioning and maintenance of power line carrier, voice frequency telegraph, remote control and indication, telemetering, teleprinter, H.F. radio and P.A.X. equipment. Some knowledge of power system protection would be an advantage.

The successful applicant will be stationed at the Board's Headquarters in Salisbury, Southern Rhodesia, but some travelling throughout the Board's system will be necessary.

Reasonable transfer and removal expenses will be paid for the successful applicant and his family and there is a pension scheme which he will be required to join.

Applications giving particulars of age, training, qualifications, experience and marital status, should reach the Secretary, Federal Power Board, P.O. Box 630, Salisbury, Southern Rhodesia, not later than 20 Dec., 1960. (T 19)

THE EAST MIDLANDS ELECTRICITY BOARD
Lincolnshire Sub-Area

SENIOR ASSISTANT (STORES)
Vacancy No. 107/60.

SALARY: N.J.C. Grade 4, £890 x £30—£1,010 per annum.

The successful applicant will be required to take charge of the Sub-Area and Grantham District stores and to advise on storekeeping procedures in other Districts within the Sub-Area.

Applicants should have a knowledge of the types of materials, plant and equipment, etc., used by the Board and be conversant with storekeeping and stock control practices.

Applications should be forwarded to the Manager, Lincolnshire Sub-Area, North Hse, Grantham, Lincs, within 14 days of the date of this advertisement.

Lincolnshire Sub-Area

LINCOLN DISTRICT
Vacancy No. 128/60.
SENIOR DEMONSTRATOR

Salary: N.J.C. Grade 2, £700 x £25—£775 per annum.

or

DEMONSTRATOR

Salary: N.J.C. Grade 1, £600 x £25—£700 per annum, according to qualifications and experience.

Applicants must be over 21 years of age and have experience in conducting demonstrations in Service Centres and in general Service Centre duties, including advice to consumers on the selection and use of electrical appliances both at the Service Centre and on consumers' premises.

Candidates should possess the E.A.W. Electrical Housecraft Certificate, and for the position of Senior Demonstrator they should hold the E.A.W. Diploma.

The Service Centre and Demonstration Theatre, which are of modern design and construction, is being opened this month. Applicants will be expected to use initiative to develop theatre displays and demonstrations on modern lines, covering all aspects of the domestic field.

Applications should be forwarded to the Manager, Lincoln District, Brayford Side North, Lincoln, within 14 days of the date of this advertisement. (T 65)

EASTERN ELECTRICITY BOARD
Suffolk Sub-Area

ELECTRICIANS
314/60.R.

VACANCIES for electricians are occurring in the Diss, Harleston, Ipswich, Leiston, Stowmarket and Woodbridge areas. Applicants should be skilled craftsmen experienced in domestic, commercial and industrial installations.

Rates and conditions in accordance with the National Joint Industrial Council Agreement for the Electricity Supply Industry, the present rate being 5s 6½d per hour for a 42-hour, five-day week.

Apply by letter to the Secretarial Officer, Suffolk Sub Area, Eastern Electricity Board, Finborough Hall, Stowmarket, Suffolk, by 12 Dec., 1960. (T 59)

LONDON ELECTRICITY BOARD

ASSISTANT DISTRIBUTION ENGINEERS

APPLICATIONS are invited for the above positions in the Board's Eastern District at 84 Romford Rd, Stratford, E.15.

Applicants should have had a sound technical education to the standard of the Higher National Certificate, and possess practical experience in all branches of engineering work associated with the organisation of a District distribution department.

The posts are graded under Schedule A of the National Joint Board Agreement as Class J, Grade 14, £805 per annum rising to £920 per annum, inclusive of London Area Allowance.

Application form obtainable from Manager, Eastern District, 84 Romford Rd, Stratford, E.15, to be returned completed within 14 days of the publication date of this notice. Please quote ref.: PER/V/3110/T. (T 60)

THE EAST MIDLANDS ELECTRICITY BOARD

ORGANISATION AND METHODS OFFICER

Vacancy No. 135/60.

SALARY: £2,170/£2,380 per annum in accordance with Class C, Grade 5 of the National Joint Managerial and Higher Executive Grades Committee Agreement.

Applications are invited for the post of Organisation and Methods Officer at Area Board Headquarters.

The person appointed will be responsible to the Deputy Chairman of the Board for an Organisation and Methods Unit undertaking investigations into organisation and administrative procedures.

Applicants should possess a professional qualification as an Accountant, Engineer or Secretary or a University degree and have had experience in a responsible position in a large organisation.

Applications stating age, qualifications and experience should be forwarded to the Secretary, The East Midlands Electricity Board, Mapperley Hall, Lucknow Ave, Nottingham, within 14 days of the date of this advertisement. Applications quoting Staff Vacancy No. 135/60 should be sent in a confidential envelope endorsed "Organisation and Methods Officer." (T 64)

SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following position:

THIRD ASSISTANT DISTRICT ENGINEER
(OPERATION AND MAINTENANCE)
MID-CORNWALL DISTRICT (BODMIN)

Salary according to Class F, Grade 9, Salary Scale 6, £890/£1,015 per annum of the N.J.B. Agreement.

The successful candidate will be responsible to the Second Assistant District Engineer (Operation and Maintenance) and will be required to undertake general duties on the maintenance of the E.H.V., H.V. and L.V. networks, and will be expected to undertake standby duties.

Previous experience and qualifications leading to the Higher National Certificate in Electrical Engineering are required and the possession of a current driving licence is desirable.

Applications to be made on standard form AE6/ACT, OBTAINABLE BY POST-CARD ONLY, from the District Manager, South Western Electricity Board, St. Petroc's, Bodmin, Cornwall. Closing date for receipt of completed applications is 17 Dec., 1960. (T 63)

YORKSHIRE ELECTRICITY BOARD

No. 4 (Leeds) Sub-Area

WETHERBY DISTRICT
THIRD ASSISTANT DISTRICT ENGINEER
(GARFORTH)

APPLICANTS should possess a good general and technical education and training and have had experience in the construction, operation and maintenance of E.H.V. and M.V. overhead and underground distribution systems in a mixed Urban and Rural District.

The successful candidate will be required to reside in the locality.

Salary: N.J.B. Class F, Grade 9 (Scale 6), £890/£1,015 per annum.

Applications, together with the names of two referees, should be sent to the Manager, Yorkshire Electricity Board, No. 4 (Leeds) Sub-Area, Bramhope, nr. Leeds, not later than 16 Dec., 1960. (T 61)

CENTRAL ELECTRICITY GENERATING BOARD

South Western Division

STATION SHIFT CONTROL ENGINEER

Vacancy No. ET/AV/172/60.

REQUIRED at Bath Power Station. Superannuation Scheme. Salary: N.J.B. Class D, Grade 10, Scale 3, £715/£805 per annum, plus £90 Shift Allowance.

Candidates should possess good technical qualifications and have had training and experience in the control and operation of steam generating plant and main switchgear.

Previous applicants need not re-apply.

Applications on Form AE6/ACT obtainable from the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 9 Dec., 1960. (T 62)

UNIVERSITY COLLEGE OF THE WEST INDIES

APPLICATIONS are invited for the CHAIR OF ELECTRICAL ENGINEERING. Revised salary (including entertainment allowance) £2,850 p.a. Child allowance. F.S.S.U. Unfurnished accommodation at rental not in excess of 10% of basic salary. Passages for up to five persons on appointment, normal termination and study leave (once every three years). Detailed applications (six copies), naming three referees, by 31 Dec., 1960, to Secretary, Inter-University Council for Higher Education Overseas, 29 Woburn Sq, London W.C.1, from whom further particulars may be obtained. (T 34)

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

APPLICATIONS invited for the following superannuable N.J.B. Schedule A appointments in the South Wales Division:

ASSISTANT ENGINEER
(COMBUSTION AND EFFICIENCY)
TIR JOHN POWER STATION, SWANSEA

Vacancy No. 315/ET/60.

Salary: Class H, Grade 7, Scale 10 (£1,190/£1,325 per annum).

Applicants should possess H.N.C. or equivalent qualfications, and have had experience with large pulverised fuel boilers and Bailey Automatic Combustion Control. Research is at present being carried out on efficient burning of Anthracite Duff for improvement on existing plant and for possible new Anthracite burning station in South Wales.

SHIFT CHARGE ENGINEER
USKMOUTH "A" POWER STATION
WEST NASH, Nr. NEWPORT, MON.

Vacancy No. 316/ET/60.

Salary: Class K, Grade 6, Scale 13 (£1,440/£1,610 per annum), plus 10% shift enhancement.

Applicants should possess H.N.C., or equivalent qualifications, and have had operating experience in a modern power station.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 16 Dec., 1960. (T 58)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

ASSISTANT MAINTENANCE ENGINEER
(ELECTRICAL)

REQUIRED at Stourport "A" and "B" Power stations, N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K.7, £1,350/£1,500 p.a.

A sound technical training and practical experience in electrical maintenance is required, preferably in a modern power station, and the possession of an appropriate technical qualification will be an advantage.

Apply, quoting Vacancy No. 328/60MD, on form AE6, available from the Station Superintendent, Stourport "A" and "B" Power Stations, Severn Side, Stourport-on-Severn, Worcs, to whom they should be returned to arrive not later than 19 Dec., 1960. (T 74)

ASSISTANT ELECTRICAL ENGINEER required for London office of large multiple retail store to assist in the preparation of drawings and specifications of electrical installations, etc. Applicants should have served an electrical apprenticeship and preferably attained City and Guilds Course "C" standard or equivalent and must be a capable draughtsman. Age 24-26 years. Salary: £650/£800 per annum according to age and experience. Write giving full particulars to Surveyor's Department, P.O. Box 209, North Row, Marble Arch, W.1. (T36)

Experienced Electrical and Mechanical Draughtsmen required for H.T. and L.T. Switchgear Contracts Drawing Office. Rates in excess of recognised published minimums for men with right experience. Apply:

Personnel Manager,
South Wales Switchgear Ltd.
Blackwood, Mon. (T 30)

RESIDENT ENGINEER

FOR NIGERIA

Applications are invited for the appointment on agreement of a SENIOR RESIDENT ENGINEER to supervise the construction in the Eastern Region of Nigeria of a new Gas Turbine Power Station of 2×10,000 kW generating capacity. Assistants will in due course be appointed to work under his direction.

Applicants must be Corporate members of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers, and should have had previous experience of power station construction including civil, mechanical and electrical work.

The salary of the successful applicant will be at the rate of £2,750 per annum. In addition, he will be provided with free accommodation, hardfurnishing, and free medical attention for himself and his family. He will also be eligible on commencement and termination of his engagement for free first-class passages for himself and his family (including children not more than three in number).

The period of the engagement will be 12 to 18 months. Leave on full pay will be granted on satisfactory termination of engagement at the proportionate rate of six weeks per year of service.

The successful applicant will be required to take up his duties in the early part of 1961 and will be in the employment of:

Preece, Cardew and Rider,
Consulting Engineers.
8, 10 and 12 Queen Anne's Gate,
Westminster, London S.W.1.

to whom applications, giving full details of age, qualifications and experience, should be submitted within 14 days of the publication of this advertisement. (T 31)

AUSTRALIA. Applications are invited for FITTERS for transformer manufacturer in Sydney. Applicants should be in the 25-35 age group. Please write with full details of experience, etc., to Box No. 3733, c/o Charles Barker and Sons Ltd., Gateway Hse, London E.C.4. (T 20)

SALES ENGINEER

An opportunity arises for a young Electrical Engineer to be trained to sell Power Transformers of all types in the range 5 kVA to 5 MVA, and eventually to take a leading place in the sales force of a progressive organisation. Minimum education requirement H.N.C. A pleasant personality and energetic attitude is essential.

Apply: The Manager Director, Gresham Lion Group Ltd., Gresham Hse, Twickenham Rd, Hanworth, Middx.

(T 23)

BRUSH

(A member of the Hawker Siddeley Group—Industrial Division)

DESIGN ENGINEERS
DESIGNER DRAUGHTSMEN
DRAUGHTSMEN

This Company, which is situated on the outskirts of a small town amid the pleasant Leicestershire countryside, requires fully experienced men in the above categories to work on:—

RAIL TRACTION CONTROL GEAR

A.C., D.C. AND TRACTION ROTATING ELECTRICAL MACHINES

SWITCHGEAR

MOTOR CONTROL GEAR

GENERAL ENGINEERING

RESEARCH EQUIPMENT

Attractive salaries, stable employment, assistance with housing and removal expenses in appropriate cases are only some of the advantages of coming to work for BRUSH.

We shall be pleased to receive your application, *which will be treated in the strictest confidence* and you should address it, quoting reference: PL.9903 to Mr. A. Garner,

BRUSH ELECTRICAL ENGINEERING COMPANY LIMITED, LOUGHBOROUGH, LEICESTERSHIRE (T 56)

J. & P.

SALES ENGINEER

Resulting from a promotion to an Overseas appointment within the company, a vacancy occurs at our London office for a qualified Electrical Engineer with sales experience.

The man appointed will be responsible for selling cables, transformers and switchgear to the Oil Industry and to certain indirect export houses in London. He will probably be in the 30-40 age group and be an Associate or Graduate Member of the I.E.E.

This is a senior appointment with good salary and prospects. The man appointed will participate in the Company's Pension Scheme and a car will be provided.

Applications giving full details should be addressed to:

The Employment and Welfare Manager, JOHNSON AND PHILLIPS LTD., Charlton, S.E.7. (T 73)

EXPERIENCED INSTALLATION SUPERVISOR required for industrial and commercial contracts, capable of planning and estimating. Superannuation scheme available. Southern England.—Box No. 8087, Electrical Times. (T 25)

BRITISH Engine Boiler and Electrical Insurance Co. Ltd., Longridge Hse, Manchester 4, ELECTRICAL SURVEYORS required in Scotland and Manchester. Permanent positions carrying progressive salary with non-contributory pension. Candidates, age 26 to 32, with H.N.C. in Electrical Engineering or Grad. I.E.E. and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply stating age, qualifications and experience. (T 51)

ELECTRIC Cable Makers require experienced ESTIMATOR for their Rubber and Plastic Estimating and Costing Departments. Good salary and conditions for the right applicant. Apply: Sterling Cable Co. Ltd., Aldermaston, Berks. (T 53)

THE CERAMIC RESISTORS DIVISION OF MORGANITE RESISTORS LIMITED

seek for their Works, near Worcester, an

ELECTRICAL ENGINEER

A qualified Electrical Engineer is required to assist in the development of a wide range of linear and non-linear ceramic bonded resistors for the Electronic, Automobile and Heavy Electrical Industries.

For this interesting work a knowledge of high-voltage phenomena, oscillography, power transformers or E.H.T. switchgear would be an advantage, but is not essential.

A good salary based on qualifications and experience will be paid. The Company operates a Superannuation and Life Assurance Scheme.

Applications in confidence to the Staff Manager, Morganite Resistors Ltd., Ceramic Resistors Division, Woodbury La, Norton, nr. Worcester. (T 70)

ELECTRICAL ENGINEER required for Glasgow Office Staff, age 23-28. Applicants (H.N.C. minimum) should have had experience in the manufacture of electrical machines. Progressive salary with non-contributory pension. Applications stating age, nationality, qualifications and experience to British Engine Boiler and Electrical Insurance Co. Ltd., 98 West George St, Glasgow C.2. (T 50)

FOREMAN ELECTRICIAN required by well-known Engineering Company. Applicants should be well experienced with A.C. and D.C. equipment including machine tool work. Some experience with H.F. plant and temperature control equipment would be an advantage. It is also desirable that applicants should possess O.N.C. and H.N.C. in Electrical Engineering. The post is permanent and offers a good salary and other attractive conditions of employment. Reply in confidence with details of age, qualifications, experience and present position to: Personnel Manager, Ambrose Shardlow and Co. Ltd., Ealing Wks, Meadow Hall, Sheffield 9. (T 48)

DESIGNER

Applications are invited from Engineers with qualifications of at least H.N.C., preferably in Mechanical Engineering, for design and development work on M.V. circuit-breakers and fuse switchgear. Creative initiative and aptitude for design work is important, switchgear experience desirable.

Good salary and prospects with a company near the South Devon Coast. There is a non-contributory pension scheme, and housing accommodation will be available if required.

Apply, giving full details of qualifications and experience to the Chief Designer, Ottermill Switchgear Ltd., Ottery St. Mary, Devon. (T 49)

TRINIDAD AND TOBAGO ELECTRICITY COMMISSION

West Indian Engineers who are interested in careers with the Trinidad and Tobago Electricity Commission are invited to write to the Secretary, P.O. Box 121, Port of Spain, Trinidad, West Indies. There are good opportunities for young West Indian Nationals with degrees in Electrical Engineering or who hold Higher National Certificates in Electrical Engineering or who are Graduate Members of the Institution of Electrical Engineers. Commencing salary £1,050 per annum. Experience not necessary, but candidates *must* be qualified. (T 47)

EXECUTIVE APPOINTMENTS LIMITED
78 Wigmore Street, London, W.1.

W. H. Allen Sons and Co. Ltd. have two vacancies at the Bedford works to satisfy immediate plans for development:

ASSISTANT DESIGNER (A.C. MACHINES)

is required to be responsible for the complete design in co-ordination with the Chief Draughtsman and Research Department of A.C. machines—appropriate salary—unusual opportunity for promotion.

This man will be probably 35-40 with a B.Sc. (Engineering) degree—be an A.M.I.E.E. and have had at least ten years' practical experience mainly in design of A.C. machines up to 3,000 kW output at 11 kV. (BA.80A.)

RESEARCH ENGINEER (ELECTRICAL)

is required to conduct research and development in co-operation with the Design Section of generators and control equipment, D.C. and A.C. (up to 11 kV)—four-figure salary—promotion to senior engineer envisaged.

The right man should have a good honours degree in electrical engineering, a persistently inquiring and imaginative mind and have had practical experience in this field. (BA.80B.)

Both appointments enjoy the benefits of excellent life assurance and pension schemes—also removal and house purchase legal costs will be refunded.

Please write briefly in strict confidence to the Managing Director of E.A.L., quoting the reference number.

(T 42)

AN ELECTRICAL INSTALLATION DRAUGHTSMAN
is required by
W. H. ALLEN SONS & CO. LTD.
for their
WORKS ENGINEERING DEPT.

Applicants should have had experience of detailing power distribution schemes, heating, lighting and ventilation, sub-stations and installation of electrical plant for machinery and as test loads for diesels and turbines.

Qualifications should include at least an O.N.C. in Mechanical or Electrical Engineering and age should be over 25 years.

The position will be available early in the New Year and conditions include a Contributory Pension Scheme with free Life Assurance and financial assistance towards moving, where appropriate.

Applications in writing giving full personal details, experience, etc., to:

The Personnel Manager (Ref.: 16060/4)
Queens Engineering Works,
Bedford. (T 24)

LABORATORY TECHNICIAN required for Electrical Engineering Department, L.C.C. Wandsworth Technical College, Wandsworth High St, S.W.18. Duties include preparation and maintenance of equipment—some knowledge of electronics essential. £265 at 16 to £580. 39-hour week. Holders of recognised qualifications: £370 at 17 to £660. Particulars and form, returnable within 14 days, from Secretary, quoting (ESTAB.7/E/2984/11). (T 37)

WELL-KNOWN Pump Manufacturers in the Birmingham area require a CHIEF ELECTRICAL ENGINEER who will be responsible for the design of submersible type induction motors from fractional to medium horse power sizes and also automatic control schemes for pumping equipment.

Applicants should preferably have had previous experience of submersible motor design, but persons with considerable experience of industrial type motors would be considered.

Automatic control gear experience is essential.

Qualifications required are a Degree or Higher National Certificate in Electrical Engineering, together with Corporate or Graduate Membership of the Institution of Electrical Engineers.

The starting salary will be according to age, qualifications and experience.

Apply Box No. 8097, Electrical Times. (T 52)

GPO

A FIRST-CLASS JOB IN THE G.P.O

Men between the ages of 20—35 are required to work in Central London on installing and maintaining telephone apparatus and transmission equipment. Older men, up to the age of 45, will be accepted if they have the experience which is particularly suitable.

Commencing pay is £9 16s per week rising to £12 2s.

Men who show ability to progress will be given every opportunity to qualify for Technical Officer posts on which the salary is £600 a year rising to £850. Further promotion is available.

Apply in writing stating age and experience to:

Chief Regional Engineer
(Ref. S/D2A(X2)),
London Telecommunications Region,
Waterloo Bridge House,
Waterloo Road,
London, S.E.1. (T 14)

A LONDON Consulting Engineer engaging staff for large and interesting new projects now requires supporting staff for his Senior Electrical Engineers. The Grade most required is that of JUNIOR ELECTRICAL ENGINEER/DRAUGHTSMAN to work on electrical installation design within buildings, the salary for this grade being £650/£850 according to experience in this field.

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Applicants should state age, experience, qualifications and salary required. Box 8099, Electrical Times. (T 75)

RAPIDLY expanding Manufacturing Electrical Engineers require AGENT/REPRESENTATIVE for Lancashire and Cheshire, with enthusiasm and drive.—Box No. 8075, Electrical Times. (T 15)

PYROTENAX LIMITED

Require a Technical Sales Engineer for work in their Heating Section at Hebburn, Co. Durham. The man we have in mind should be an electrical engineer with a sound knowledge of cables who is interested in applying this knowledge to space heating problems. Apply in writing stating experience, qualifications and indicating salary requirements to:

The Commercial Manager,
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(T 40)

ENGINEER TECHNICAL SALES

A large, progressive and rapidly expanding Company in the North of England wishes to appoint an Engineer to its Technical Sales Staff.

Applicants should be between the ages of 30 and 40, and should have an electrcial maintenance engineering background. Also, since the successful applicant will be closely concerned with supervising the erection of specialised equipment in power stations, experience as an efficiency engineer with power stations would be very desirable.

This appointment is a senior one and, in consequence, offers an attractive salary and conditions of employment. It is unlikely that anyone at present earning less than £1,400 per annum will have the necessary qualifications. In addition, the Company has Pensions and Life Assurance Schemes, together with a Profit Sharing Scheme. Assistance with housing will be given where necessary.

Detailed applications, including qualifications, experience and present salary, should be marked "Confidential—Engineer (T.S.)," and sent to Box No. 8095, Electrical Times.

(T 43)

ARE YOU ONE OF THE YOUNG ELECTRICAL ENGINEERS WHO ARE

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Worried because they are becoming too specialised too soon?
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Obtain a general knowledge and experience of the latest control schemes associated with the most up-to-date industrial applications and particularly schemes concerned with automation projects.

Discuss in detail the design of these control schemes with the system design engineers responsible for them.

Gain time to broaden your engineering knowledge before choosing a specialised field, either with us or elsewhere in industry.

by joining the

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of the
ENGLISH ELECTRIC COMPANY LIMITED
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If you wish to learn more about these opportunities please write to Dept. G.P.S., English Electric Hse, Strand, London W.C.2, giving details of previous experience and qualifications and quoting reference ET1292F. (T 71)

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INDUSTRIAL APPLICATION ENGINEERS

Vacancies exist in our Application Divisions for engineers interested in the problems of applying electrical equipment to industrial processes—particularly electrical drive systems. The work which these vacancies cover include the determination of electrical equipment performance which will best meet the requirements of a process, the design of equipment layout and installation and the design of high voltage and low voltage distribution systems.

The work is of particular interest to young qualified engineers who enjoy meeting people and selling technical ideas, while at the same time doing a job requiring high technical ability. Travel to various parts of the United Kingdom and overseas is often necessary.

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Please write giving details of qualifications and experience to Dept. G.P.S., English Electric Hse, Strand, London W.C.2., quoting reference ET1296L. (T 72)

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ELECTRICAL Contractor and Maintenance Engineer (established over 30 years) has excellent business connections and requires more help owing to increasing business in Central Essex.

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For further particulars apply Box No. 8089, Electrical Times. (T 26)

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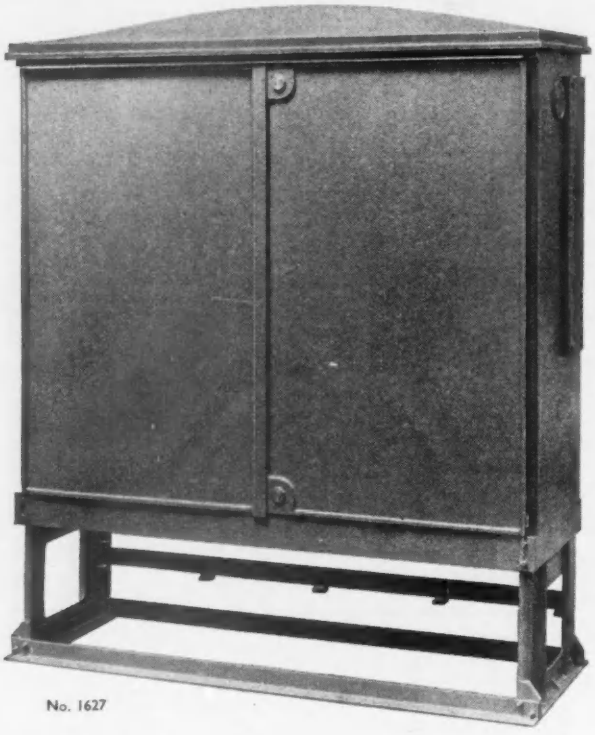

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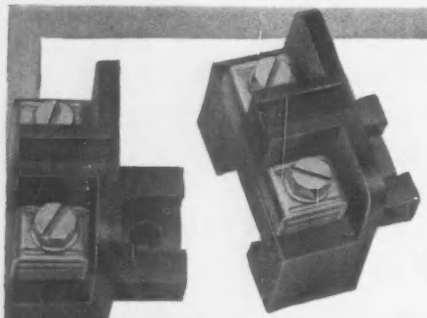

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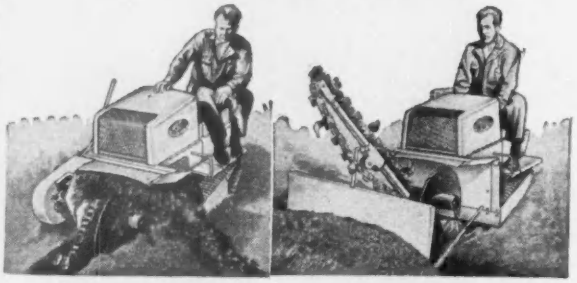
The ALLEN 3/12



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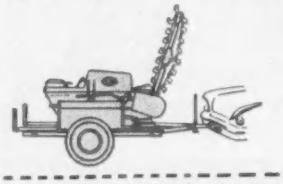

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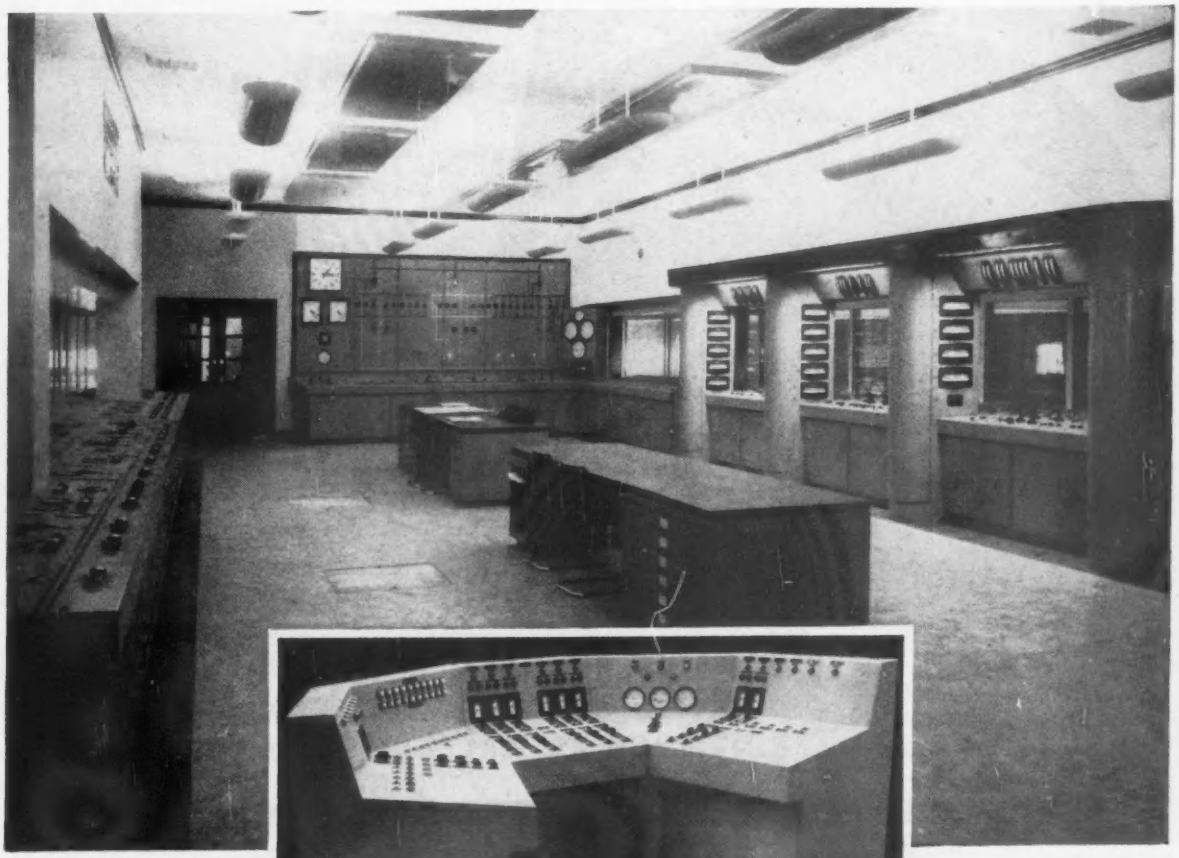

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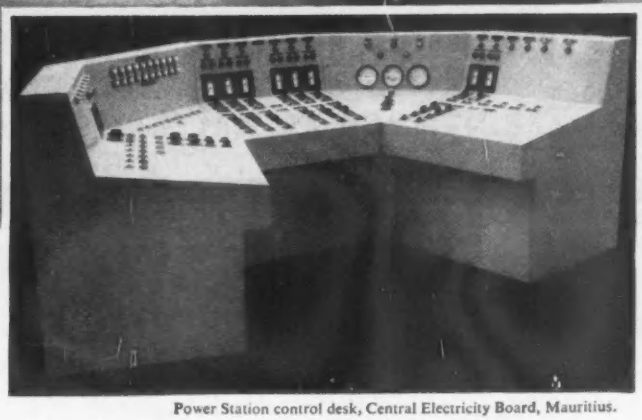

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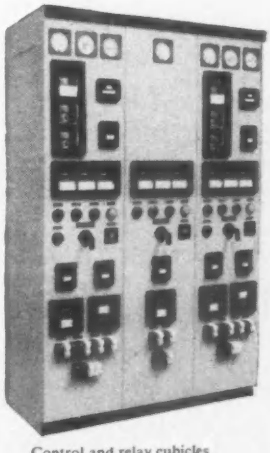

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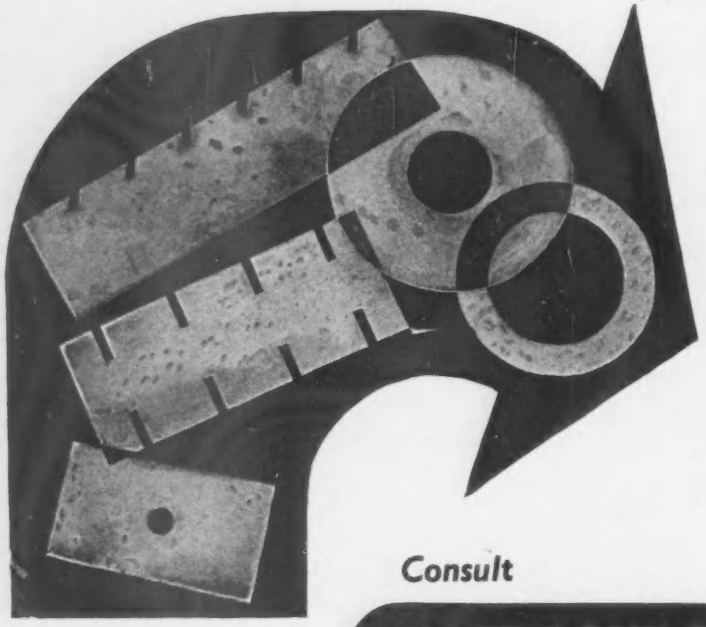

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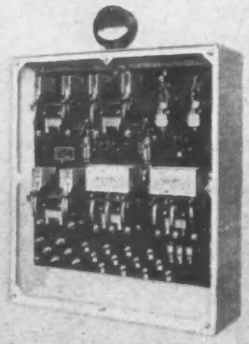

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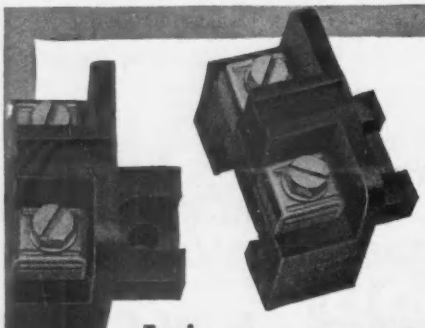

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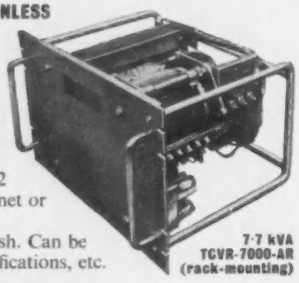

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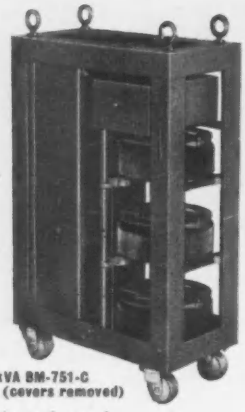

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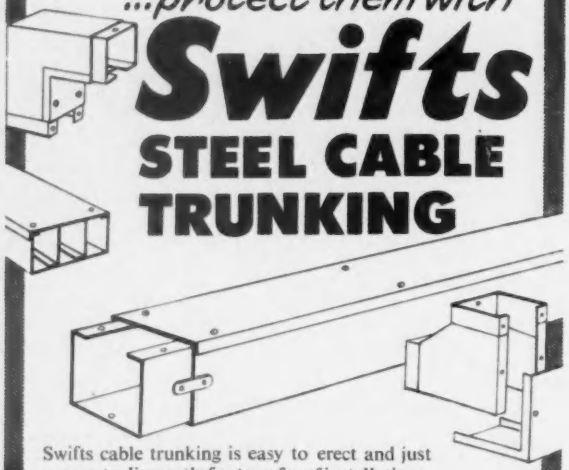

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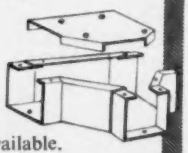

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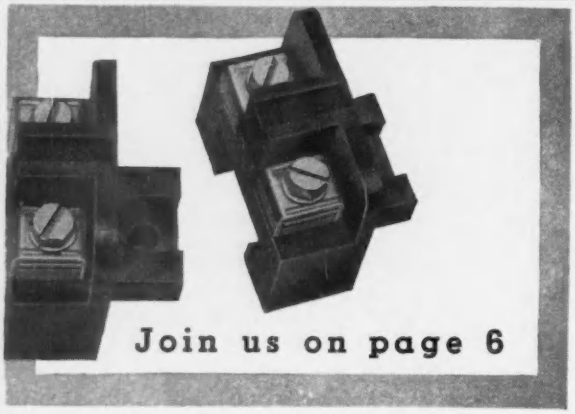

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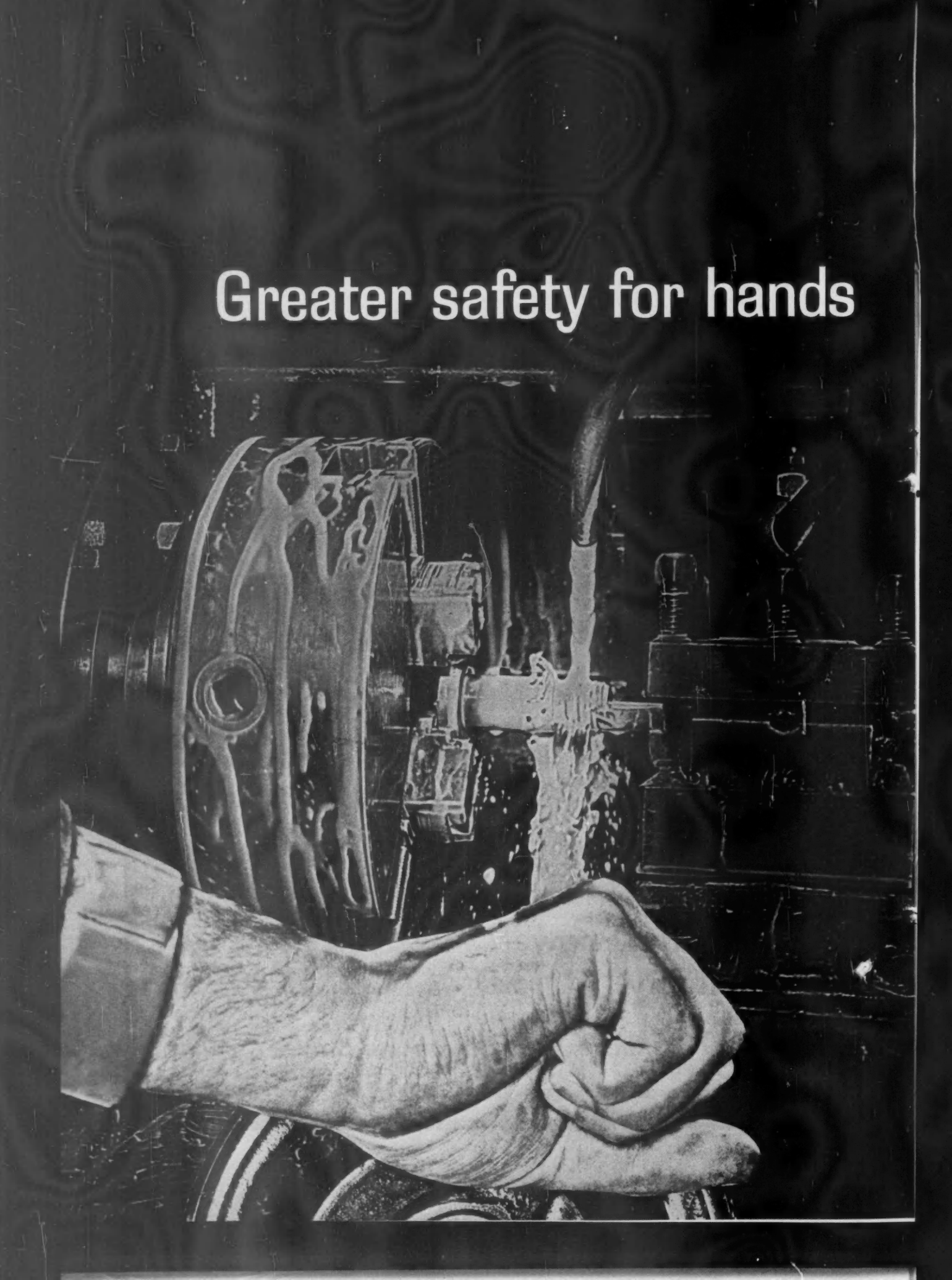

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Most modern soluble cutting oils contain phenolic compounds used as coupling agents between the oil and the emulsifier, for better blending and easier mixing. These phenolic compounds can cause skin irritation, especially where modern high-speed machines are used and the emulsion can concentrate, through the evaporation of water, above the safety level.

Shell research chemists have been working on this problem, which has been causing some concern to Management. After considerable research, Shell Dromus Oils have been reformulated and these new cutting oils now produce bland emulsions, which considerably reduce the risk of skin trouble to operators.

The real difficulty was to find a new coupling agent to replace the phenolic compounds, and Shell finally used what their chemists know as a higher fatty alcohol complex. This solved one problem, but presented another. The new coupling agent was volatile at the high temperatures normally used in blending processes. Further research found a solution to this problem by designing and installing new plant.

The new Dromus Oils are every bit as efficient as before and cost no more. They put Management in the welcome position of being able to minimise working hazards at no extra cost. And machine men need no longer be so worried about skin troubles.

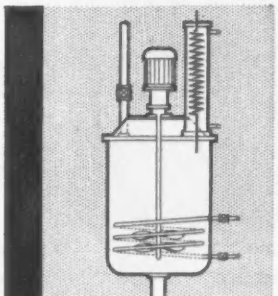
The moral of the story is that Shell research is supremely applicational. The centre at Thornton is always ready to work with even the most specialised sectors of industry to produce the right oil for the job. If you and your organization have any major lubricating problems, it pays to get in touch with your local supplier of Shell Industrial Lubricants.

The Research Story

Shell chemists in the U.K., in Holland and in the U.S.A., prepared and examined hundreds of experimental soluble oils, and established that certain combinations of fatty alcohols could be used in place of phenolic compounds with no loss of efficiency. They set to work to discover the best combination and developed a higher fatty alcohol complex which fitted exactly. Then they realised that to blend this new coupling agent into soluble oils would require special plant and new blending techniques.

Exhaustive testing of blend stability, emulsion stability, anti-corrosion and machining properties led to selection of the most promising blends. A pilot plant was set up to produce batches of these for use in field trials.

This field testing and final development proceeded for two years whilst production plants were erected at points so chosen as to give the most economical and rapid delivery throughout the United Kingdom.



This is the blending kettle. The reflux condenser beside the stirrer motor prevents the loss of constituents volatile at the blending temperature.

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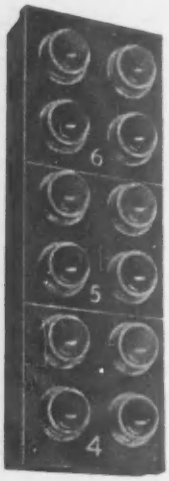

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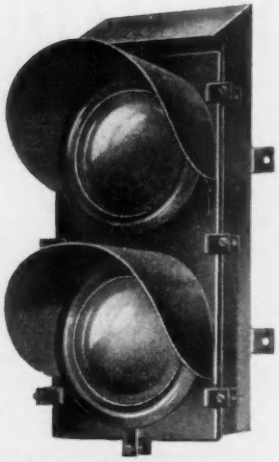

Illustration (Right) shows weatherproof Traffic Control Indicator recently manufactured

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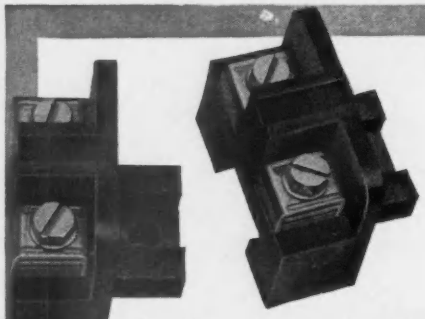

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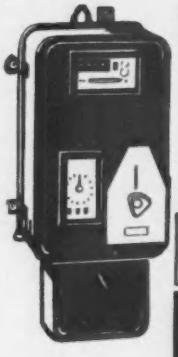

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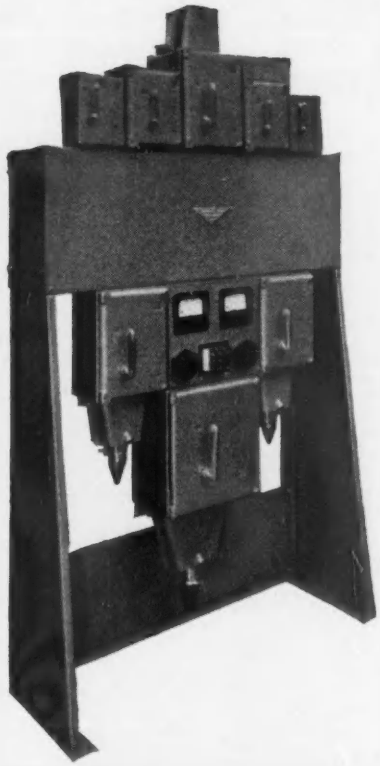

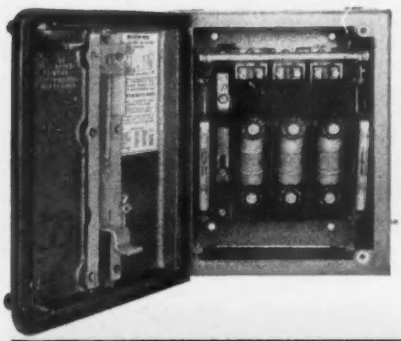

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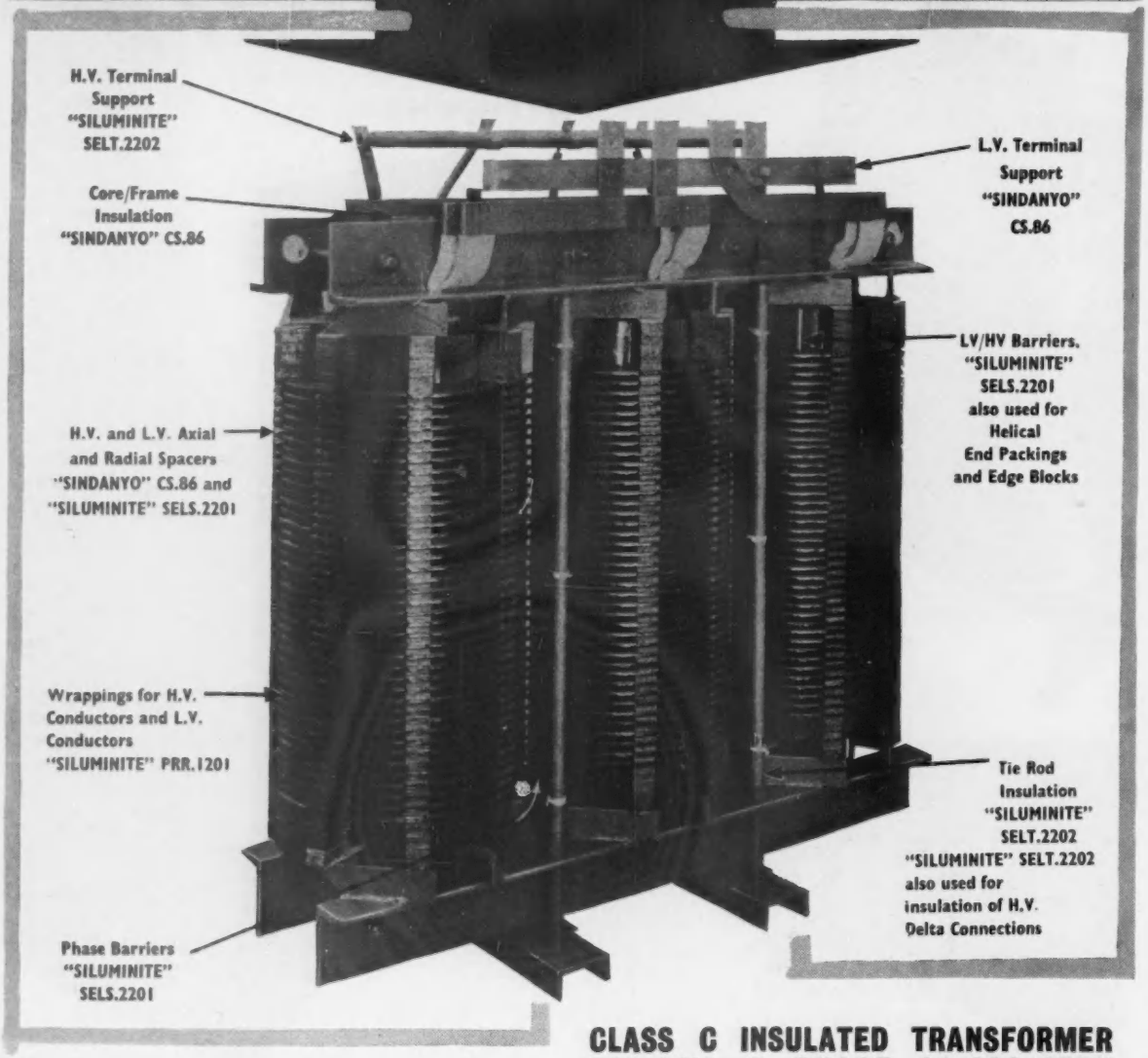
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